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Clear the Way for Progress!

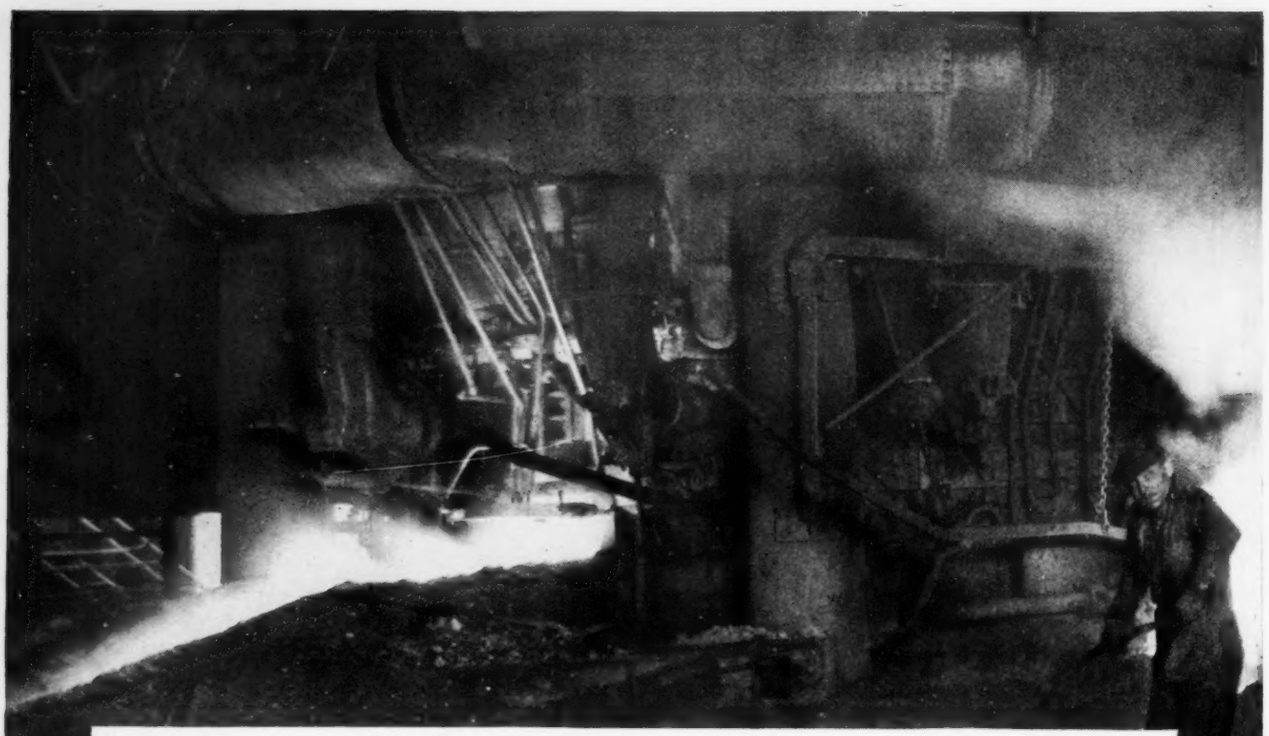
DEPARTING from a year of business gratifying in volume but not uniformly satisfactory in profits, American industry enters 1929 with the prospect of unabated activity and slightly improved earnings. Superficially, the projected panorama of the new year is brilliant with the promise of prosperity, but in the background—subdued but none the less perceptible—are traces of somber color, symbolic of a doubt which pervades the industry.

This dark specter is unreal and almost undefinable. It persists in spite of the most optimistic assurances of competent authorities. In the minds of many otherwise astute business men, it amounts almost to an inferiority complex, based no doubt on the seeming paradox that surrounded on all sides by all of the ingredients of prosperity, certain of the metalworking industries are not sharing equitably in its benefits.

The complaint is not that prosperity does not exist; rather it is that prosperity is not distributed according to the degree of effort expended and service rendered. Iron and steel producers, fabricators, manufacturers of metal products, engineering establishments and distributors all concur in the conviction that competition is forcing them to forego the measure of profit that is rightfully theirs. This problem, which embraces price-cutting, merchandising, relations with competitors and customers, and a lengthy chain of other practices, is the only disturbing factor in an otherwise pleasing economic environment. Its solution unquestionably is the most urgent task confronting the industry.

Hope for alleviation does not lie either in the revision of legislation affecting business or in any other artificial means of contravening economic forces. It rests in the *attitude of mind* of those who guide and execute the affairs of the industry. It demands that every vestige of vindictiveness, recrimination and obstinacy be removed and that a spirit of constructive co-operation and understanding rule.

Once the will to solve this problem becomes an overpowering impulse in the mind of every executive, the present evils of competition will fade out quickly, freeing the metalworking industries of America of their only serious annoyance and clearing the way for the uninterrupted march of progress.



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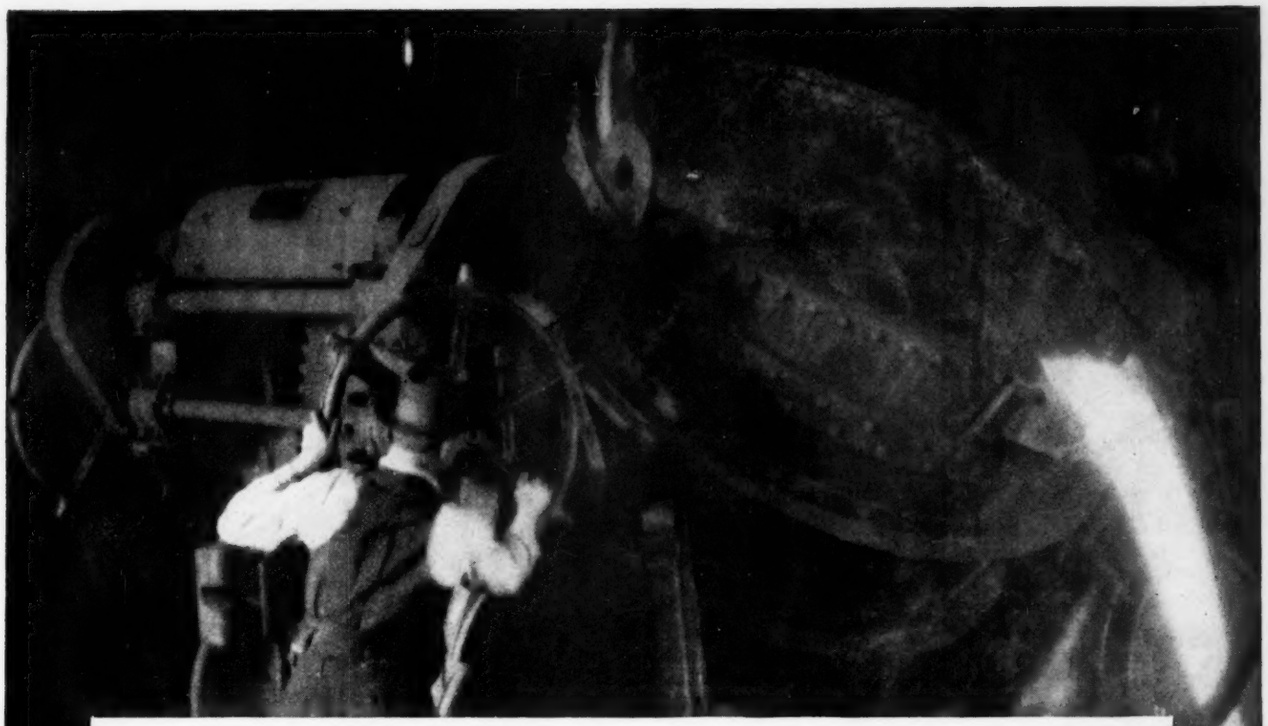

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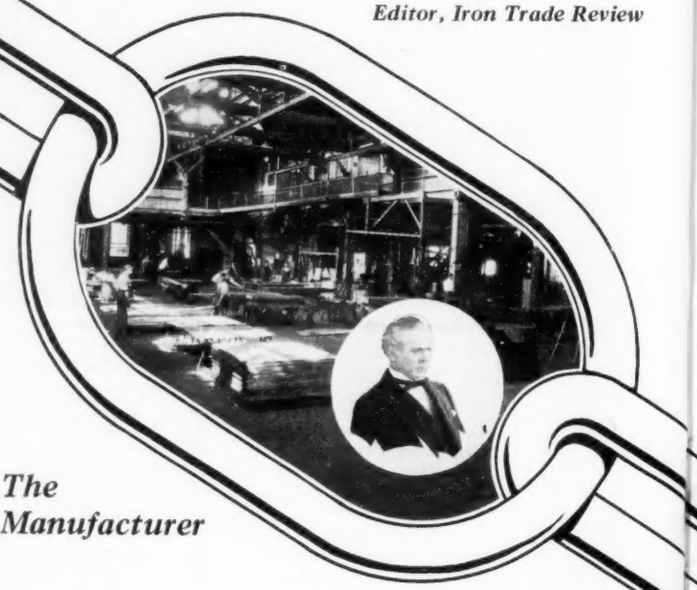
Balanced Prosperity

Reward for Service

By E. L. Shaner
Editor, Iron Trade Review

The Producer



The Manufacturer

YOUTHFUL though it may be in years, the stabilized condition of industry embracing hand-to-mouth buying, express speed delivery, minimum inventories and unprecedented service to customers appears to be soundly established as a permanent institution. By no distortion of imagination can one versed in business conceive of an early return to the era of forehanded ordering, deliberate shipments and distribution of the inventory burden on the shoulders of the consumer. The pace of industry is too swift and the synchronization of producing, distributing and consuming machinery keyed to too high a pitch to admit of even the thought of reversion to the old order.

In many respects present conditions are decidedly preferable to the previous reign of feast or famine, but in developing the efficiencies which have contributed to the new stability, we not only have exchanged old problems for new ones, but we also have multiplied the complexities of business administration. Moreover, for the moment or at least so long as the current buyers' market prevails, the new problems are bound to bear much more heavily upon producers than upon consumers.

For instance, hand-to-mouth buying, while a service of undoubted value to purchasers, imposes certain unavoidable hardships upon sellers. Rolling of steel involves careful scheduling of available mill capacity and multiplication of small orders adds to the difficulty of maintaining a steady output of the various shapes and sizes. Thus small-lot buying serves to remove the necessity on the part of the customer of exercising foresight in determining his needs and to impose additional burdens upon the mill operator.

Thanks to the remarkable service rendered by American railroads, it now is possible for manufacturers to operate on an extremely narrow margin of stocks. Large automobile foundries, which at one time insisted on maintaining supplies of pig iron requisite for several months of full-time operation, now prefer to keep on hand only enough iron for six days' melt. This policy has been adopted by hundreds of consumers of iron, steel and other materials. Many of them are so thoroughly wedded to this plan of operation that they have no physical facilities for handling or storing more than a few days' supply of the principal materials purchased.

Obviously this practice has greatly reduced the amount of money tied up in material in transit and in stock. It has been estimated that since 1919 about six billion dollars has been freed from industrial inventories in this manner. If this figure is even approximately correct, we must admit that it reflects credit upon the sellers of material and equipment and upon the transportation agencies. Moreover, it must be conceded that those most directly responsible for this remarkable achievement have not received any reward for their six-billion dollar service to industry.

Another serious problem of the steel industry is obsolescence. The courageous spirit of modernization is conspicuous on all sides, it being estimated that between 1914 and 1928 almost two billion dollars was spent in rebuilding and improving the properties of the larger companies. In the words of Charles M. Schwab, "it is fortunate that the steel industry has been able to spend huge sums for replacements, because consumers have been enabled to procure their requirements for much less than they would otherwise have had to pay." While these expenditures are fully justified by the resulting efficiency of the new equipment, the financial returns are long deferred, if not altogether dissipated in other channels. Myron C. Taylor declares that "almost inevitably profits gained through improvements have been passed on to the public through reduced selling prices and to employes in higher wages."

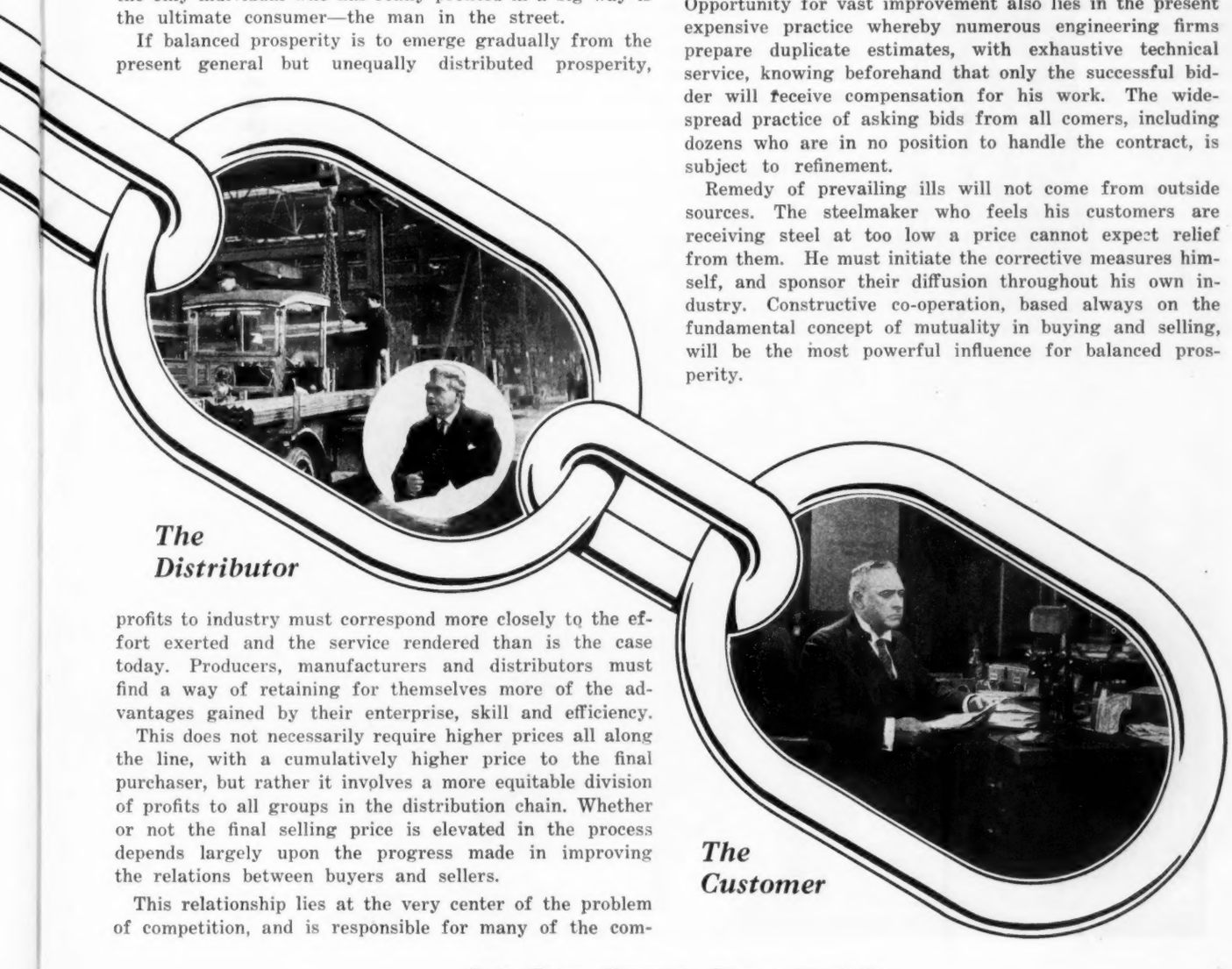
Advantages gained by producers in other ways, as through efficiencies arising from consolidations, improved management, etc., seldom are retained in the form of profits, but are passed along to customers in lower prices. Fabricators and manufacturers whose principal pur-

Requires Equitable To All Groups

Producers, Manufacturers and Distributors Should Discontinue Practice of Passing on to Customers All of Advantages Gained Through Own Efficiency

chased materials are iron and steel have been buying at favorable prices, but they, too, have passed along to their customers not only the advantage of cheap materials but also the benefits derived from their own efficiency. In many cases warehouse interests, jobbers and others in the distribution chain likewise have relinquished their rightful reward for service so that in the final analysis, the only individual who has really profited in a big way is the ultimate consumer—the man in the street.

If balanced prosperity is to emerge gradually from the present general but unequally distributed prosperity,



The Distributor

The Customer

profits to industry must correspond more closely to the effort exerted and the service rendered than is the case today. Producers, manufacturers and distributors must find a way of retaining for themselves more of the advantages gained by their enterprise, skill and efficiency.

This does not necessarily require higher prices all along the line, with a cumulatively higher price to the final purchaser, but rather it involves a more equitable division of profits to all groups in the distribution chain. Whether or not the final selling price is elevated in the process depends largely upon the progress made in improving the relations between buyers and sellers.

This relationship lies at the very center of the problem of competition, and is responsible for many of the complaints now current. Much of the trouble may be traced to the fact that buyers and sellers seldom meet on even terms. In a sellers' market, the salesman has certain advantages over the purchasers, while in a buyers' market, such as exists today, the one who buys has the upper hand. If either chooses to use his advantage unjustly, a condition of unfair competition immediately is created.

Since the economic trend of industry produces frequent shifts from a sellers' market to a buyers' market and vice versa, it is not surprising that a spirit of vindictiveness is aroused in the minds of a few who are engaged in buying and selling. This attitude on the part of even a small minority is sufficient to throw up a cloud of distrust and suspicion, which is harmful to all industry.

Obviously the remedy for this situation is education. If every salesman and every purchasing agent could be made to understand that buying and selling are complementary functions—that to be economically sound a transaction involving the passage of goods or services from one to another must be mutually advantageous—then a good start would be made toward the solution of all of the ills attributed to competition.

The extent of savings that would result from more intelligent buying and selling is beyond comprehension. Even a partial reduction in the losses now incurred in industrial transactions would wipe millions of dollars annually from the cost of distribution. Abuses in the prevailing methods of awarding contracts on bids—including the unwarranted manipulation of proposals by both parties—alone are responsible for tremendous waste. Opportunity for vast improvement also lies in the present expensive practice whereby numerous engineering firms prepare duplicate estimates, with exhaustive technical service, knowing beforehand that only the successful bidder will receive compensation for his work. The widespread practice of asking bids from all comers, including dozens who are in no position to handle the contract, is subject to refinement.

Remedy of prevailing ills will not come from outside sources. The steelmaker who feels his customers are receiving steel at too low a price cannot expect relief from them. He must initiate the corrective measures himself, and sponsor their diffusion throughout his own industry. Constructive co-operation, based always on the fundamental concept of mutuality in buying and selling, will be the most powerful influence for balanced prosperity.

Aviation, Skyscrapers, Radio Reveal New Vistas for Use of Steel

Will Airplane Emulate Automobile as Important Factor in Steel Consumption? Large Building and Bridge Prospects Take Noteworthy Tonnages

By W. H. Lloyd

Steel takes to the air in planes, taller buildings and radio apparatus

AIR-MINDEDNESS—as typified in the public interest in aerial communication—rapidly is assuming material significance to the steel industry. Alert producers are watching the increasing tonnage of their product going into airplanes, hangars, and other equipment in the field of air transportation; into radio sets and accessories, and related equipment for television, talking moving pictures, etc.; and into tall buildings, whose towers reach ever higher into the sky. And they wonder what the future development in these three lines will mean in terms of steel consumption.

Steel touches the 125,000,000 people of the United States in so intimate a manner, it lies so close to the gaze, that often its importance and potentiality are but little realized. Future historians, however, will refer to the present as "the steel age," as present day writers look back upon "the stone age," "the ice age" and other eras.

At times each year it appears that the steel industry is overbuilt. Then come periods of extra heavy demand, as was experienced last September and October, when despite fresh high records in steel ingot output the chief desideratum of consumers is expedited delivery. This only means that as steel tonnages increase, fresh adaptations are uncovered and new uses are developed.

By no stretch of imagination today can it be foreseen that the aircraft industry will ever attain the magnitude of the automobile industry. And yet, is not the position of the steelmaker 30 years ago with reference to the automobile comparable with that of the steelmaker today in regard to aircraft? Then the tendency was to make light of the fledgling automotive industry, give it a wide berth and let it work out its own salvation. Should not the steel industry today take a leaf out of history's book and pay proper respect to the new infant? In 1900 no one would have had the temerity to prognosticate that by 1928 the automotive and allied industries would account for 35 per cent of the steel produced in the country. What shall we say for the coming quarter century? Undoubtedly similar wonders will be wrought in air transportation as have been accomplished on land. Will the steel industry be ready? Aircraft construction by its very nature precludes any great tonnage possibilities, the elimination of deadweight being paramount. It is from aircraft production that the major tonnage is to be derived. In dirigibles the chief metal used is duralumin, much lighter than steel. In airplanes the use of lighter

metals also prevails. However, many parts necessarily are steel. Cylinders or cylinder liners have been made of carbon steels but some manufacturers now use nickel steel castings. Others have adopted welded chromium-molybdenum and the early utilization of nitrided special steels is a strong possibility. The Bethlehem Steel Co. is producing out of the solid large numbers of hydraulically forged steel airplane cylinders by the extrusion process at Bethlehem, Pa.

Seamless tubes, which for many years have enjoyed widespread application in the bedstead, bicycle, railroad and automobile industries, now are entering the aircraft industry in constantly increasing tonnages, for welded fuselage. Alloy steelmakers too have their eyes focussed upon the aircraft field, since therein lies their greatest potential expansion.

Since 12,000 to 15,000 planes are under contemplation for 1929 against less than 4000 made in 1928, the expansion in steel consumption should keep pace. In 1927, according to Luther K. Bell, secretary of the aeronautical chamber of commerce, 1995 planes were manufactured, valued at $5,000,000, while in 1921 none was produced commercially. At the Dec. 1 aircraft exhibition in Chicago, he estimated that commercial production for 1928 would aggregate 3665 planes, with a retail sales value of approximately $35,000,000. In addition military construction under the auspices of or by the government would bring the total above 4000. Tripling the commercial output in 1929 will create a selling value considerably in excess of $100,000,000. As 1928 closed the monthly output of approximately 700 planes promised to step up perceptibly before 1929 is far advanced. The Ford Motor Co. plans to produce one of its 12 to 15-passenger tri-motored transports daily by April 1. The two plants of the Fokker Aircraft Co., at Hasbrouck Heights, N. J., and Wheeling, W. Va., are to be enlarged and the company will add a third and larger plant in California.

Alloy Steel Requirements Heavy

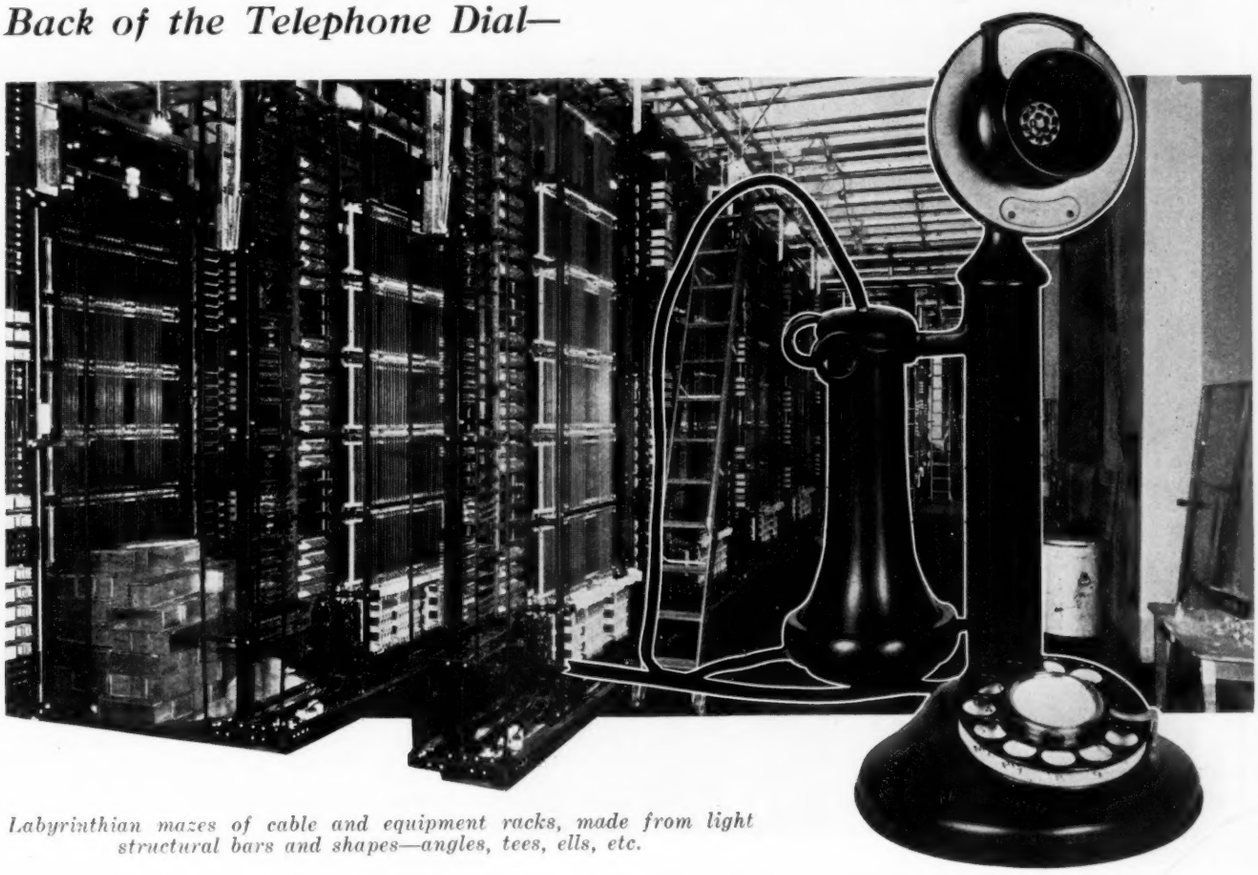
H. J. French, senior metallurgist of the bureau of standards at Washington, recently estimated that 1929 will develop a need for at least 1500 tons of alloy steels for engine parts, 3000 tons of alloy steel for tubing, 100 tons of alloy steel for bearings and 50 tons of alloy steel sheets and strips. The aggregate is approximately 5000 tons and the market value about $1,000,000. Representative steel sellers believe Mr. French has been ultra conservative.

The use of stainless steels or other corrosion resisting material will show expansion as the need for watertight pontoons grows. These largely will substitute for duralumin, which under certain conditions has proved unsatisfactory. Stainless steel too is in use in engine exhaust pipes, exhaust line valves and other parts.

Another related outlet for steel in the aircraft industry is in the tooling up of machine shops for aircraft builders as well as for airports, hangars, etc. The Wright Aeronautical Corp., Paterson, N. J., placed orders in one week late in 1928, involving an expenditure of $350,000 for this purpose. This brought its year's expenditures for this purpose in excess of $1,000,000.

Airports and hangars are an exceedingly important part of aviation and in themselves represent a valuable asset to the steel industry. Especially in hangars are large tonnages of structural steel involved. A case in point is the Akron, O., hangar of the Goodyear-Zeppelin Corp. The contract for structural steel, involving 6500 tons, was let late in December. Approximately 400 tons of concrete bars and a large tonnage of corrugated galvanized sheets also were awarded. The Austin Co., specializing in this field, has built more than 20 airports since 1917 and has contracts for several more. At the No-

Back of the Telephone Dial—



Labyrinthian mazes of cable and equipment racks, made from light structural bars and shapes—angles, tees, ells, etc.

vember elections bond issues were passed by 11 cities and counties, from $25,000 to $5,000,000 each, for airport construction work. In 1928 over $21,000,000 was appropriated for the purpose. The United States department of commerce lists 331 private and commercial airports, 256 intermediate landing fields, 62 army and 17 navy aviation fields and 326 officially marked auxiliary fields. Over 750 airports are proposed for early construction and, according to authoritative estimates, the United States will have more than 1700 airports before October, 1929.

Indicative of the way radio is forging to the front in the utilization of steel, omitting requirements of the General Electric Co. and the Westinghouse Electric & Mfg. Co., the consumption of electrical sheets for radio purposes is now equal to the tonnage of that grade of sheet metal used in all other directions. Large quantities are utilized for radio power packs, taking 10 to 15 pounds apiece. Audio transformers require two to three pounds each. The latter must be a good grade of high silicon steel, although some manufacturers have successfully used medium silicon.

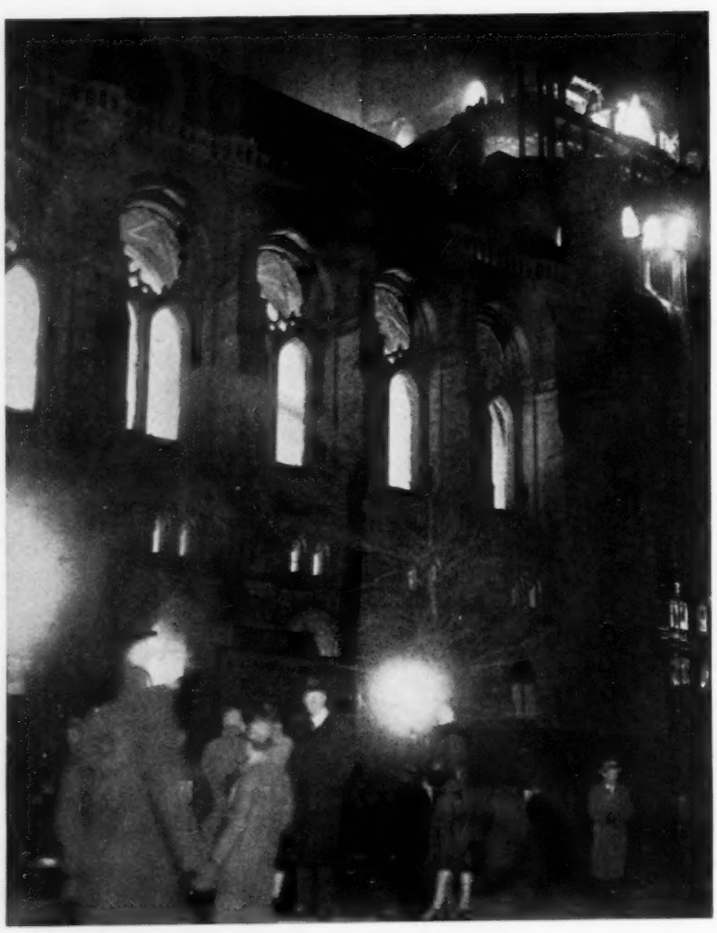
Radio's new use of steel, however, is in connection with all-steel cabinets, consoles, etc. One company in the Philadelphia district, which last November turned out its 2,000,000th set, is said to use a carload of strip and sheet steel every three days. Loud speakers also account for a relatively high tonnage of flat rolled steel. Large amounts of cold finished steel bars are indirectly absorbed by the radio industry due to the increasing use of machine screw products.

The familiar pair of towers atop tall buildings, betokening a broadcasting station within, has commanded attractive tonnages of steel. However, a great tonnage of steel is hidden to the outsider's gaze. Battery rooms are equipped with racks and shelving made of steel pipe and sheets. Wire mesh and screen too are utilized in this way in increasing tonnages as are other forms of steel.

The new year looms importantly for radio sales since in 1929 they are destined measurably to outdistance the estimated total for 1928. These are said to have attained a value of $750,000,000. This compares with $446,000,000 for 1927 and $506,000,000 for 1926. As a result largely, of the 1928 effort, one family in four in the country possesses a radio set. One radio company official says that whereas 9,500,000 American homes are equipped with alternating current, only about 15 per cent are provided with alternating current radio receiving sets, hence he sees in that fact great sales possibilities for 1929.

That the radio market has only been scratched on the surface is generally conceded. Television, radio moving pictures for the home, talking motion pictures, televox and various other departures seem slated for startling advancements within the next year. The latest of these is a teletypesetter, a machine which by means of robots, is able to set type at long distance. Each improvement or innovation thus made, means the consumption of more steel. Twenty-one stations are to install radio vision in

Recommends Steel Scaffolding To Reduce Fire Hazard



WHEN the scaffolding in the nearly completed Riverside church on Riverside drive, New York, which was to house the Park Avenue Baptist church, caught fire Dec. 22, the firemen were rendered practically impotent in fighting the flames, which mounted spectacularly into the lofty spire, despite their use of the huge water tower working under 750-pound pressure. About a year ago, the wooden scaffolding on the top of the Sherry-Netherlands hotel, New York, caught fire and burned in a similar way, with the firemen helpless in their efforts to extinguish the blaze.

Fire Chief John Kenlon of New York grew indignant at the height of this latest holocaust, because of the apparent negligence of the contractors and builders. He commented as follows on the virtual gutting of Dr. Harry Emerson Fosdick's new church: "This place might just as well have been a lumber yard so full was it of wooden scaffolding and piles of hardwood to be used for interior finish. There should be a law compelling builders to use steel for their scaffolding in tall buildings."

Adjustable steel scaffolding has been designed for repeated, and therefore, for economical use. The next logical step would seem to be the general adoption of steel for this purpose, thus reducing the fire hazard in large cities, particularly in tall buildings in course of construction.

the near future and this seems only the beginning of this development.

Rivaling the "Tower of Babel" days, office buildings seem to have the sky for their ultimate destiny. A dinner table conversation in New York last October resulted in the placing of a 17,000-ton award for structural steel for a 67-story office building there, as casually as the diner might have ordered more water. Buildings 40 to 60 stories high are becoming increasingly common. As engineers increase their knowledge of stresses and strains, buildings tend higher and bridges longer. The Newport News-James river bridge, formally opened this year, has a span five and one-half miles long and cost $7,000,000. The weight of the suspended structure of the Hudson river bridge at New York is 90,000 tons while that of the Philadelphia-Camden bridge is 40,000 tons.

Outlets Are Promising

Grade eliminations, electrification of steam railroads entering large cities, subway installation all promise to be more extensive in 1929 than before. They offer appreciable outlets for steel in ever expanding tonnages.

No small assistance in this direction was forthcoming from the interstate commerce commission at Washington recently when it decided not to compel the railroads of the country to make further installations of train control apparatus. Instead, the commission ruled, public safety could be furthered more quickly at this time by concentration of railroad funds upon grade crossing separation and work upon bridges and similar structures. While to some extent this is a diversion of steel from one outlet to another, still the same amount of money will account for more shapes and reinforcing concrete bars in bridges and undercuts than in costly train control apparatus.

The trend toward all steel homes is more marked. This is attested by the fact that in Pittsburgh, Cleveland and other large towns companies have been formed for the construction of this type of dwelling exclusively.

Fireproof buildings are now an actuality instead of a desirability. Office buildings, fireproof in themselves, may now be fitted with steel doors, sash, baseboards, trim and partitions to make them 100 per cent immune from fire. At the Biloxi, Miss., meeting of the American Institute of Steel Construction, the suggestion was made that inasmuch as plates have successfully been used for open-hearth charging floors, for battleship and other ship floors with but 0.002-inch deflection, it is entirely practical to use plates ¼-inch and heavier for office building floors as a substitute for concrete. The size of the plates thus to be used would be determined by the spacing of the cross members to which they would have to be trenched.

Manufacturers of metal furniture are co-operating in the effort to make the American home safe from the demon fire. Whereas a few years ago metal furniture was a thing of ugliness confined to shop benches, work tables, bins, racks and a few uncomfortable chairs, it now is a thing of beauty combined with utility. Manufacturers next invaded the office with filing cabinets and then desks. Now tables and chairs are produced in metal which successfully defies detection from wood by the casual observer. This past year great strides have been made in the substitution of sheet steel for cast iron safes. This excursion into the realm of beautified office furniture opened up new possibilities to the metal furniture producers and now sleeping room, dining room and even living room suites can be produced in pleasing styles.

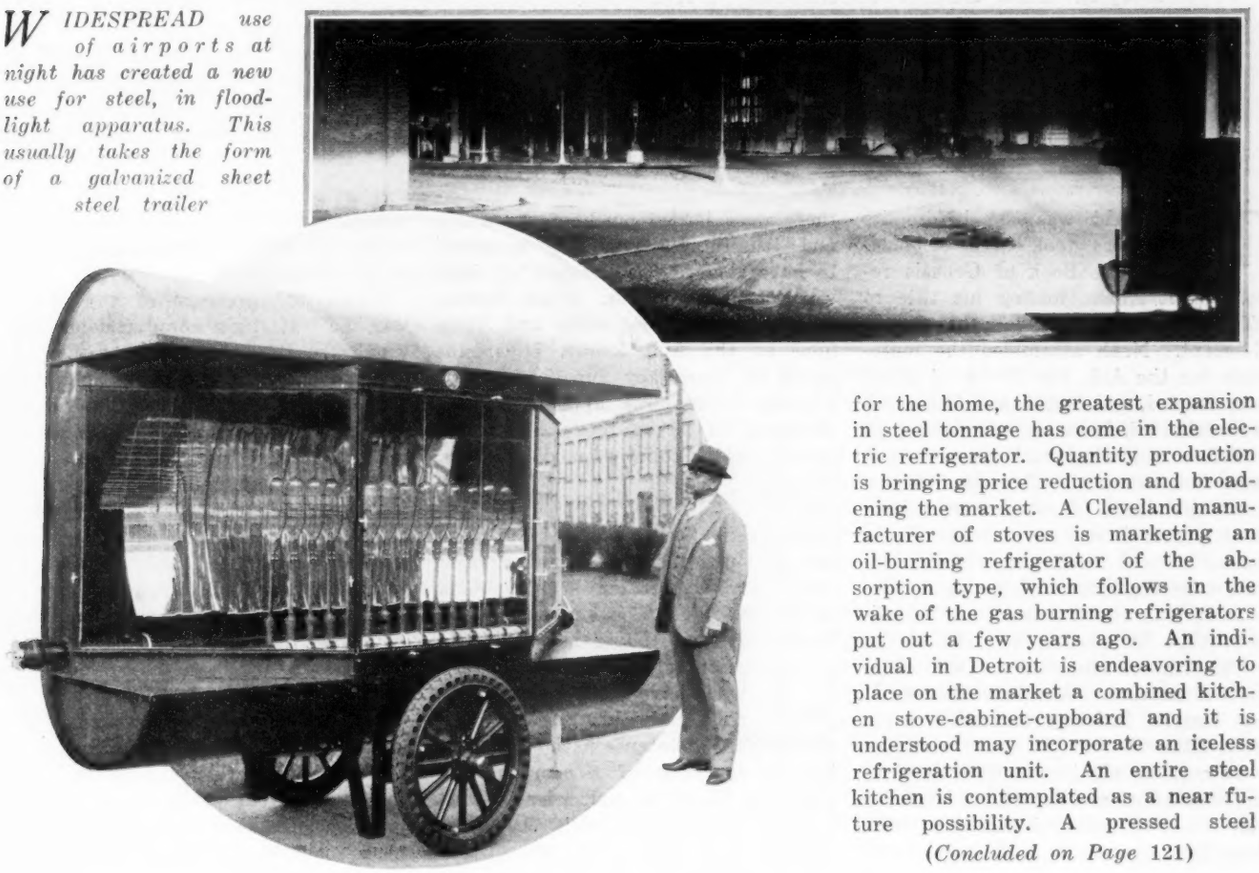
Incorporates a Humidifier

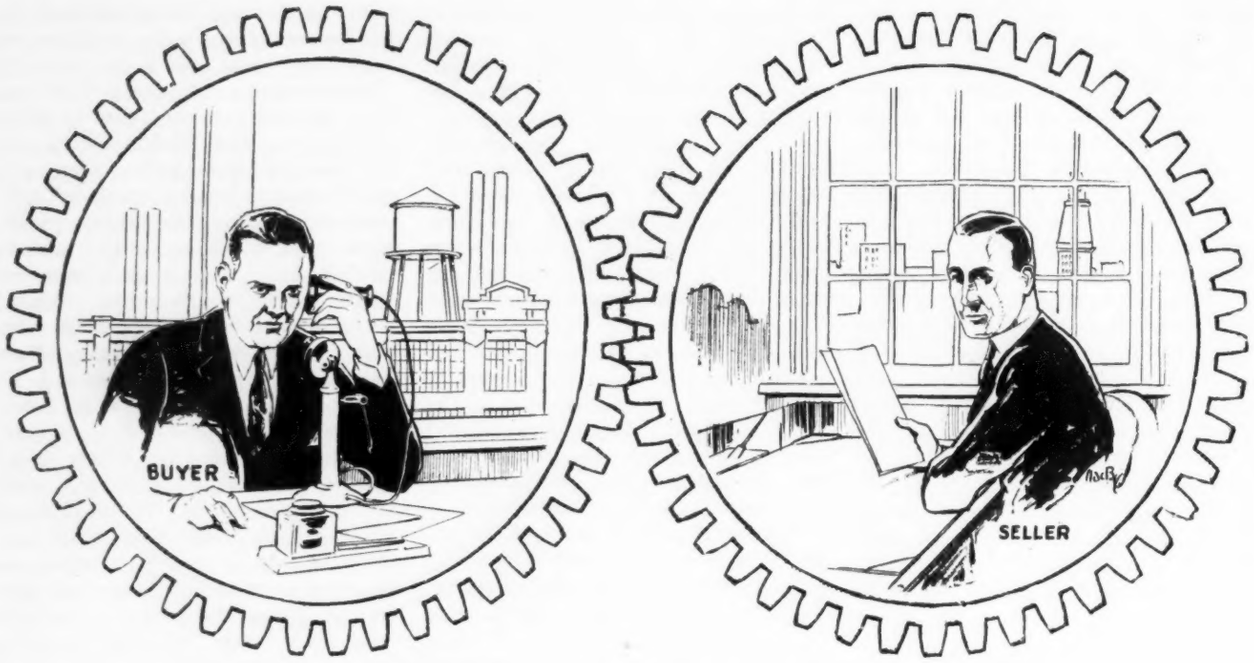
The newest types of steel radiator cabinets or radiator covers which simulate wood and woven cane incorporate a humidifying unit. One manufacturer of these recently received two orders involving 3000 of these cabinets which gives it the greatest volume of backlog in its history.

In connection with metal furniture for the home, the greatest expansion in steel tonnage has come in the electric refrigerator. Quantity production is bringing price reduction and broadening the market. A Cleveland manufacturer of stoves is marketing an oil-burning refrigerator of the absorption type, which follows in the wake of the gas burning refrigerators put out a few years ago. An individual in Detroit is endeavoring to place on the market a combined kitchen stove-cabinet-cupboard and it is understood may incorporate an iceless refrigeration unit. An entire steel kitchen is contemplated as a near future possibility. A pressed steel

(*Concluded on Page* 121)

WIDESPREAD use of airports at night has created a new use for steel, in floodlight apparatus. This usually takes the form of a galvanized sheet steel trailer





For a smooth-running business machine all gears must mesh exactly and quietly

Co-operation, for Mutual Benefit, Smooths Industry's Path

Buyer and Seller Learning Their Activities Are Complementary, Not Antagonistic—No Transaction Bodes Well for All Unless There Be a Fair Profit for Service—Codes Define Functions

By E. C. Barringer

THE world was old before its chroniclers took heed of business. The Book of Genesis records that Adam, finding his title to Eden defective, set up another establishment. Noah assembled the materials for the Ark, the Tower of Babel was erected, and Sodom and Gomorrah were allotted, built up and destroyed.

Tribes flourished and kings waged war, but not until Abraham, then a hoary patriarch of more than a hundred years, issued an inquiry for a burial ground at Machpelah did history take cognizance of business. Reconstructing the transaction, it is evident that in quoting 400 shekels of silver Ephron took advantage of a sellers' market. Abraham "shopped" but bought, insisting meanwhile on a good title.

It may be significant that the first appearance of a seller and a buyer on the stage of history involved a cemetery lot. Certain it is that then and there were buried much of the amity and trustfulness popularly supposed to have cloaked the business of those early, primitive times. From Ephron as the first recorded seller and Abraham as the first known buyer the paths of these key functions of all business intercourse appear to have diverged, to be at the poles in the *caveat emptor* policy of medieval days.

Way Paved for Rapprochement

In recent years, however, business has been undergoing a transformation, which was accelerated in 1928. The groundwork for a rapprochement between seller and buyer has been laid. As the nations of the world, chastened by the war, have been drawing together; as society has broken down the barriers of intense nationalism and become conscious of a common purpose; as the arts and sciences have become internationalized, banishing distance, broadening life and disseminating knowledge; so business has tended to drop its aloofness and become co-operative.

Under the pressure of the World war the watertight compartments into which the Rooseveltian era forced individual business enterprises collapsed. The urgent need for the materiel of war called for common effort, made it imperative that industries function as groups, brought competitors together with the sanction, if not under the lash, of the government. Peace declared, a return to the position already outgrown was impossible.

And so, for a decade, there has been a definite tendency toward co-operation, in the business community. It might be said that sellers, or producers, strengthened their bonds within one circle and buyers, or consumers, within another circle. In each instance the causes have been largely parallel. Trade associations and technical societies with their growing in-

fluence and periodical meetings, the simplified practice conferences of the department of commerce and the trade practice conferences of the federal trade commission have provided common meeting grounds. No little inspiration has been derived from the growing realization that the shrinking margin of profits in postwar years has been partially caused by internecine and unintelligent competition.

Mark well that this broader outlook, this expansiveness, of business has been of an intra rather than an inter character. Until last year the two groups—sellers and buyers—have been pretty well insulated from each other. There has been a feeling that the gulf between the two could never be bridged, that their aims and purposes were diametrically opposed, that a happy and prosperous situation of one could eventuate only at the expense of the other.

Nineteen twenty-eight has proved, however, that the spirit of co-operation within these two spheres is contagious. The improved relationships between sellers as such and buyers as such have overflowed. Business has learned that it, no more than an individual, cannot be a Janus. And for many reasons.

Hand-to-mouth buying entails radical reliance between seller and buyer. Operating without a backlog of orders, the seller or producer must look to the buyer for a steady flow of business to insure uninterrupted, economical production; without stocks, the buyer must have an unfailing, unbroken line of supply.

The keenly competitive situation, in ultimate as well as primary markets, demands the combined efforts of sellers and buyers to hold or to gain outlets. The development of new and competitive materials has necessitated common action, an example being the increasing co-operation between the sellers of plain structural steel and buyers who fabricate it in an effort to combat the aggressiveness of sellers of competing materials.

Joint Action Necessitated

The trend toward style and color even in plebeian commodities necessitates joint action, so that the raw material may conform to the demands to be made upon it. The more efficient conduct of business has involved elimination of unjustifiable expense, and selling and buying costs have undergone severe scrutiny. Efficient buying often represents the profit.

Whether cause or effect, but overshadowing all else, there is growing recognition that selling and buying are complementary and not oppositional functions of business. It is being realized that every seller is a buyer and every buyer a seller. The immorality and harmfulness of pressing for the last penny, either at the top or at the bottom of price swings, is more apparent. An unhealthy seller foreshadows danger for the buyer, and vice versa. More than ever business desires to be harmonious and healthful. For a smooth running business machine all gears must mesh exactly and quietly.

Admittedly the millenium in selling and buying has not arrived, nor have the traditional lion and lamb—to quote a simile whose controversial inference must be destroyed—laid down together, but unquestionably a start was made last year. The theory is conceded; the practice remains to be perfected. It becomes pertinent, therefore, to review what ground has been gained and to consider what obstacles must be overcome. Obviously, mutual workable relationships will become a fact rather than a hope as the causes for difference are eliminated.

Between seller and buyer the matter of price is at once the primary contact and the dividing wedge. Some are stressing values and services as

Buying-Selling Code Outlines Responsibilities, Benefits

A CODE of ethics for buyers and sellers was laid down last summer when representatives of both groups and of the business papers, including IRON TRADE REVIEW, *met in New York to discuss improved relationships:*

Unnecessary sales and purchasing expense is an economic waste, a tax on legitimate industry. Its elimination will assure satisfactory profits to the producer, economy to the consumer, and greater efficiency in commercial relations.

We recognize that the concern which buys must also sell, that buying and selling are companionate functions, that sound commercial transactions must be mutually profitable, and that co-operation between buyer and seller will reduce the cost of purchasing, sales and distribution with the consequent benefits to industry as a whole.

In furtherance of these principles, we subscribe to the following standards in our buying and selling:

First: To buy and sell on the basis of value, recognizing that value represents that combination of quality, service and price which assures greatest ultimate economy to the user.

Second: To respect our obligations and neither expressly nor impliedly to promise a performance which we cannot reasonably expect to fulfill.

Third: To avoid misrepresentation and sharp practice in our purchases and sales, recognizing that permanent business relations can be maintained only on a structure of honesty and fair dealing.

Fourth: To be courteous and considerate to those with whom we deal, to be prompt and business-like in our appointments, and to carry on negotiations with all reasonable expedition so as to avoid trespassing on the rights of others and wasting the time of buyers and salesmen.

Fifth: To avoid statements tending to injure or discredit a legitimate competitor, and to divulge no information acquired in confidence with the intent of giving or receiving an unfair advantage in a competitive business transaction.

Sixth: To strive for simplification and standardization within the bounds of utility and industrial economy, and to further the development of products and methods which will improve industrial efficiency.

Seventh: To recognize that character is the greatest asset in commerce, and to give it major consideration in the selection of customers and sources of supply.

Eighth: To adjust claims and settle disputes on the basis of facts and fairness, to submit the facts to arbitration if a mutual agreement cannot be reached, to abide by the decision of the arbiters, and to resort to legal measures in commercial disputes only when the preceding courses prove ineffective.

Ninth: To provide or accept no gifts or entertainment in the guise of sales expense, where the intent or effect is to unduly prejudice the recipient in favor of the donor as against legitimate competitors.

Tenth: To give or receive no bribes, in the form of money or otherwise, in any commercial transaction, and to expose commercial bribery wherever encountered for the purpose of maintaining the highest standard of ethics in American industry.

Large Share of Profits Often Arises in Careful Buying

CENTRALIZED purchasing, handled by an adequate organization, is now a fixed policy in virtually every concern where the volume of buying is large enough to justify the cost of purchasing organization. There has been a great development in purchasing methods in recent years and a corresponding development in the purchasing agent. The typical purchasing agent today is trained in the needs of his company, trained to distinguish value from price, trained to shoulder the tremendous responsibility of spending his company's money to best advantage.

It is quite true that all purchasing agents characteristically seek to buy at the lowest price at which a producer is willing to furnish the required material. That is an essential aim in purchasing. In typical industries, expenditures for material represent 60 per cent of the total production cost. An over-liberal or careless purchasing policy, resulting in an increase of 5 per cent in the cost of materials in the course of a year, will reduce by 3 per cent the amount of profit the company will earn in the same period.

Every dollar wasted in the purchasing department is the equivalent of the profit on a $10 sale, based on average profit returns. A wastage of 5 per cent on a purchase budget of $1,000,000 eats up the profits on $500,000 of sales. In the face of these statistics, it is futile to argue that the purchasing agent should pay a higher price for any commodity than he is required to pay by economic conditions and the desire of producers for his business. To do so would be to endanger the interests of his own company and to play into the hands of the company's competitors. There is no problem of ethics in this situation; it is purely a question of ecenomics. The sheer fact is that the real profits of industry today are the reward of careful buying.

The purchasing agent is a firm advocate of price stabilization. If he can be assured that so-called market quotations represent the lowest figures at which reputable producers will accept business, he is perfectly content, knowing that his competitors will not be offered concessions which are withheld from him. He will concentrate than on arranging the volume and time of his buying so as to gain the utmost benefit from market fluctuations. Thus he is pitting his experience and proficiency in buying against his competitors on a fair and open field.

Where producers, in a mad scramble for business, cut each other's prices with reckless abandon, the purchasing agents can be certain that the same procedure is followed with other buyers in the field. He gains no comfort from the fact that the concern which secures his order has sacrificed a part of its normal profit to give him a lower price than he should reasonably expect, for he is miserably conscious of the fact that one of the losing bidders will cut even deeper into the profit margin to win an order from his competitor across the way.—L. F. BOFFEY, *editor, "The Purchasing Agent," in a recent address before the American Institute of Steel Construction.*

ascendant over price. Another approach is clarity of price. In his presidential address at both the spring and fall meetings of the American Iron and Steel institute last year Charles M. Schwab advocated a single price structure. Last October he said:

"We in the steel industry have been charging many prices, often quoting different customers different prices for the same products on the same day. Such a policy has resulted and will inevitably result in harming certain of our customers through price discrimination, and in hurting ourselves by inviting our customers to haggle over prices and tempting them even to misrepresent the prices charged by our competitors in the hope of coaxing lower prices from us."

In July Mr. Schwab said: "I believe that our customers are happiest when they know they are paying the same price as the other fellow."

With the latter observation there is general assent among the sellers of steel and surprisingly little dissent among the larger buyers. In steel, as elsewhere, it is relativity that counts. A single price structure, as Mr. Schwab proposes, would not ignore the advantage rightfully accruing to the large buyer. Frequently in retail selling of commodities an article is priced at 10 cents each, or three for 25 cents; the preferential price is open to all and no attempt is made to drive a bargain on individual sales. In steel it is proposed to set up a base price with stated differentials for quantities. This mode was recognized in December when certain independent producers of steel bars, plates and shapes fixed 1000 tons as the dividing line between preferential and ordinary buyers.

Revision of steel extra lists last year was largely designed to improve relations between sellers and buyers. Sellers of hot strip, for example, discarded the current extras and predicated new ones upon modern mill practice. Shading of the base price on wide strip was traceable largely to the fact that the old extras, based upon the practice of many years ago, were too great while the extras on narrow widths did not compensate the sellers for additional costs. Alloy steel bar sellers early in 1928 adopted a definite mill base and established differentials for various analyses. Establishment of quantity differentials for small lots of heavy steel shipped from the mills has tended to divide mill and warehouse business sharply and minimize mill-warehouse competition.

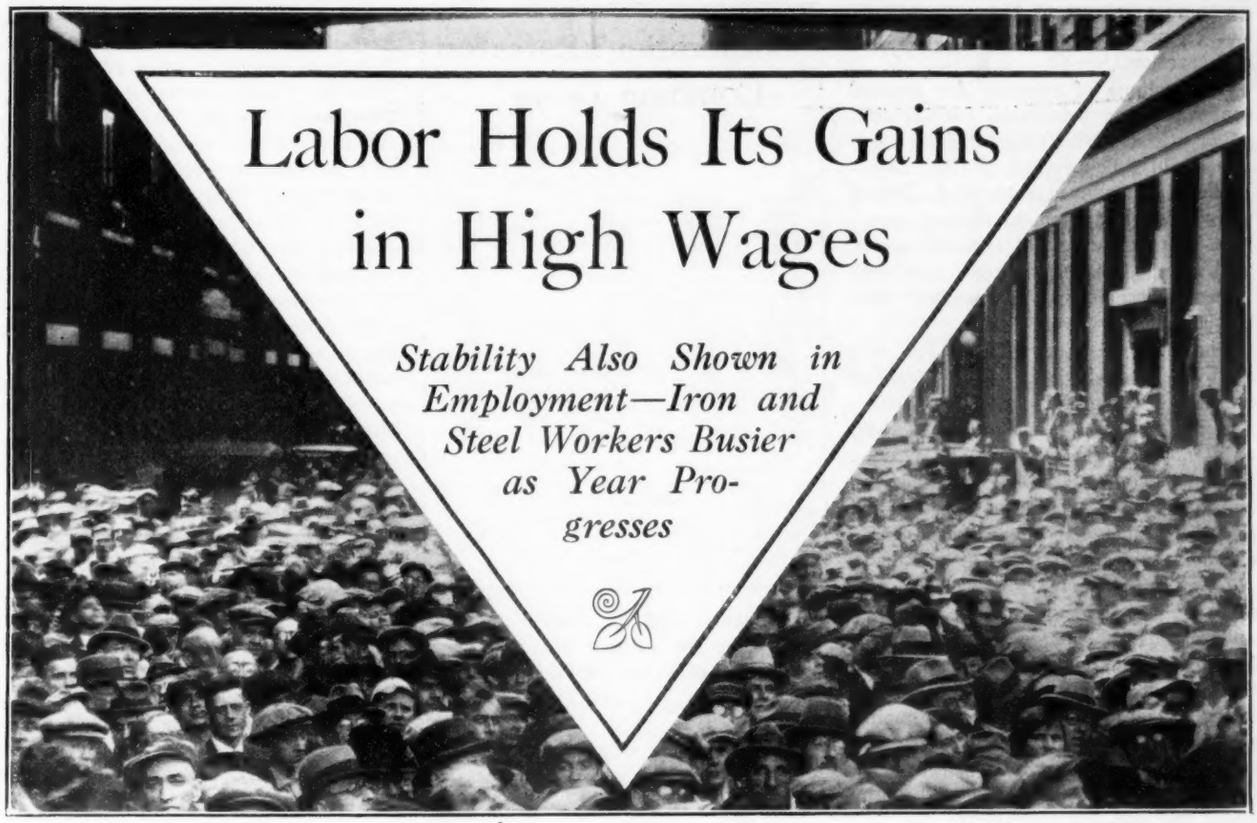
A notable contribution to harmony between seller and buyer was the conference of representatives of thirteen trade associations affiliated with the machinery industry at Montauk Point, Long Island, N. Y., in September followed by a second conference at Washington in November and a third one in Chicago in December.

Underlying these conferences was the desire to standardize the service rendered by sellers to buyers, thereby improving the relationship between the two groups. Some of the pinpricks which would be removed are wasteful buying, misrepresentation of materials, free engineering service, unlimited maintenance service and the holding of patterns.

It is contended that "service" often is a disproportionately high item in the cost of sellers. Too often is the promise utilized lavishly to swing business, to the disadvantage of the seller who is on a legitimate service basis. At the Washington conference it was asked:

"Is it economically sound and is it fair to the public to maintain practices which increase the ultimate cost of commodities? Are the concessions granted to or secured by the producer in extra services a justifiable selling expense? Should the manufacturers of machinery design and estimate cost of manufacturing specific machines at a great deal of expense without making a direct charge for such services? It appears that machine manufacturers are frequently requested to design machines only to have the expected purchaser award the contract to an-

(*Concluded on Page* 15)



Labor Holds Its Gains in High Wages

Stability Also Shown in Employment—Iron and Steel Workers Busier as Year Progresses

INDUSTRIAL labor conditions continued satisfactory in 1928. Wage earners held their gains, as the hourly rates paid to them did not decline, but tended to increase, and in some manufacturing lines weekly earnings were advanced by reason of steadier employment.

The volume of industrial employment did not differ much in 1928 from 1927, according to the bureau of labor statistics. Yet less complaint was heard of unemployment in 1928 than in 1927. No serious unemployment was disclosed in 1928, even during the heat of the national political campaign. On the other hand, the per capita bank deposits made by wage earners measurably increased, and further gains were reported in the number of industrial stock subscriptions by wage earners. The large offerings made by the leading iron and steel companies to their employes, limiting the number of shares to each to insure wide distribution, were far oversubscribed.

Gains in First Quarter

Employment in manufacturing industries started to rise immediately after January, 1928, and showed gains for three consecutive months. The second quarter, however, did not do so well. The third quarter witnessed another upturn, and the last three months of the year were the best of all, from the standpoint of employment. The index for the first 11 months of the year averaged 86, compared with 88.5 for all of 1927. These index figures are based on 100 as the average for the year 1923. The average for 1924 was 90.3; for 1925 91.2, and for 1926 91.9. Thus the index for 1928 is shown to be the lowest in six years, though close to that of 1927.

Employment in the iron and steel industry in 1928 reversed its usual course. The customary trend is to begin at a high point in the spring of the year and to slide downward toward the fourth quarter. This was especially pronounced in 1927. When the improvement set in with February, 1928, it was to continue in an almost unbroken upward line through the remainder of the year. The index for the first ten months of 1928 averaged 83.6, compared with the average of 85.7 for all of 1927. Some related manufacturing lines showed strong

How Mechanization Has Benefited Iron and Steel Workers

HERE is an illustration of what mechanization has meant to the men who work around American blast furnaces. In 1913 their average full-time hours per week were 72.5. Today the average is approximately 62. This is a reduction of 10.5 hours a week. In the same span of years their average earnings per hour increased from 17.1 cents to over 39 cents, and their average full-time weekly earnings have advanced from $12.43 to $24.34, a gain of close to 100 per cent. Now this is why manufacturers of pig iron have been able to reduce the men's working time 14.4 per cent, while at the same time doubling their wages: Productivity at blast furnaces has more than doubled in the same length of time, due to the construction of larger and more efficient blast furnaces, substitution of machinery for hand labor, and to technical improvements in operation. The result has been that the average output of pig iron per man-hour of labor has increased from approximately 0.141 gross ton to over 0.296 gross ton. While the latter figures refer specifically to output by merchant furnaces, the gain is believed to be fully as large if not larger at the steelworks plants. Data pertaining to hours, wages and productivity in the steelworks offer a close parallel, with hours reduced 17 per cent, wages advanced over 100 per cent, and productivity increased from 50 to 100 per cent.

gains in employment throughout 1928, notably machine shops and automobile construction.

The volume of payrolls for general manufacturing industries, for the first 11 months of 1928, registered an average slightly below that of 1927, namely 90, as compared with 92.4. These payroll and employment figures represent more than 11,000 establishments, with over 3,000,000 employes, and with payrolls amounting to around $90,000,000.

The index for payrolls in the iron and steel industry also averaged slightly less in 1928 than in 1927—89.1 for the first ten months of 1928, as compared with 89.3 for all of 1927. Payrolls were increasing toward the end of 1928, along with employment, and in October they were at the highest point since April, 1927.

Average weekly earnings in the iron and steel industry in September amounted to $35.53, according to the National Industrial Conference board, the highest weekly wage in 25 industries, except news and magazine printing. The automobile industry, reputed to be the highest paid, registered an average of $34.74 a month, while the general average for all industries was $27.76.

Few Reductions Made

Few reductions in wage rates were made in 1928, and only one in those industries directly related to iron and steel. The H. C. Frick Coke Co. cut wages 11 per cent effective July 1, bringing its rates in line with independents.

Hourly rates paid by subsidiaries of the United States Steel Corp. have not been changed since 1923, an indication of the stability of wages in the iron and steel industry. In April, 1923, the rate was increased from 36 to 40 cents, and in August of that year, when the 12-hour day was abolished, the rate for 10-hour men became 44 cents, and for 8-hour men 50 cents.

Corporation's Rates for Common Labor

	Wages for 10 hrs.	Per cent advance	Per cent advance over 1915
1915	$2.00	....	....
Feb. 1, 1916	2.20	10	10
May 1, 1916	2.50	13.6	25
Dec. 15, 1916	2.75	10	37.5
May 1, 1917	3.00	9	50
Oct. 1, 1917	3.30	10	65
Apr. 16, 1918	3.80	15	90
Aug. 1, 1918	4.20	10.5	110
†Oct. 1 1918	4.62	10	131
†Feb. 1, 1920	5.06	10	153
†May 16, 1921	4.05	*20	102.5
July 16, 1921	3.70	*8.6	85
Aug. 29, 1921	3.00	*18.9	50
Sept. 1, 1922	3.60	20	80
Apr. 16, 1923	4.00	11	100
††Aug., 1923	4.40	10	120

*Reduction.
†Basic 8-hour day in effect; time and one-half for overtime.
††Twelve-hour day abolished. Labor placed on 8-hour shift paid at rate of 50 cents an hour.

Union molders' wages remained unchanged for the second consecutive year. The New York union wage rate is $51 a week for a 48-hour week. This figures out at the same daily rate as previously, except that the New York rate is not strictly on a day basis. The general average for 11 foundry districts is equivalent to 92.7 cents an hour, compared with 93.6 at the post war peak and 43 cents an hour in 1914. Molders now receive for eight hours' work approximately 115 per cent over 1914.

Wages in bar iron mills having contracts with the Amalgamated Association of Iron, Steel and Tin Workers showed little change during 1928, as the average price of bar iron during the first ten months of the year was 1.90c per pound, the same as the average for the entire year of 1927. However, the base rate for puddlers was increased beginning with July, 1927, and the raise was reaffirmed in the new contract beginning July, 1928. Bar iron prices have ranged from $1 to $3 lower than in 1927, offsetting some of the advantage gained by puddlers in the higher base rate.

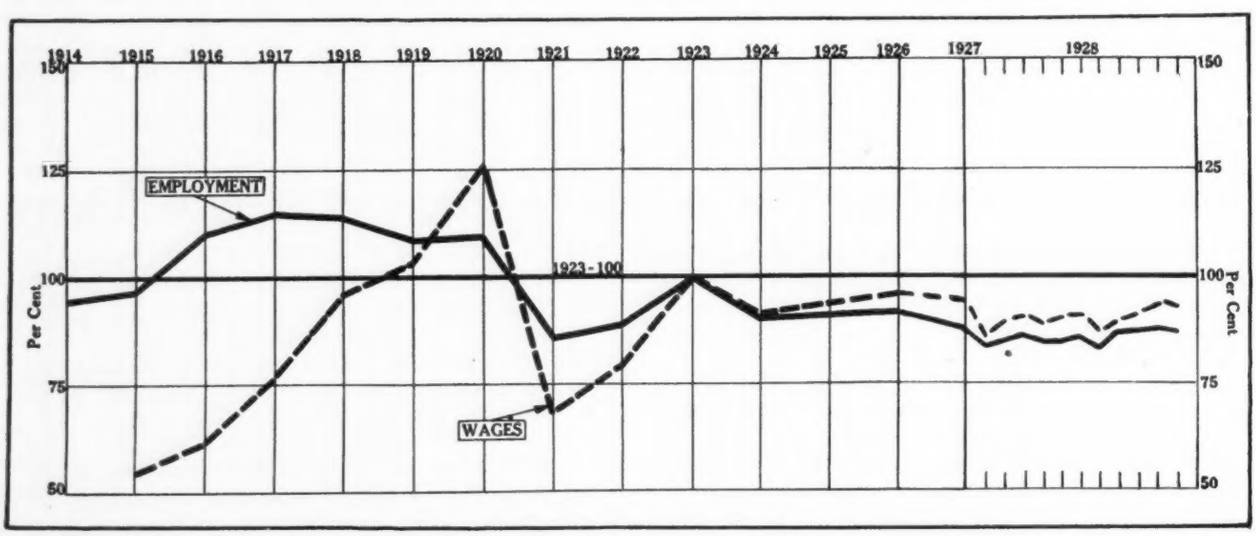
Puddlers received $11.55 per ton in the November-December, 1928, period. This was 25 cents more than in the same period of 1927. It compares with $18.76 at the post war peak of puddlers' wages, and an average of $5.60 for 1924.

Wage rates in sheet and tin mills working under arrangements with the Amalgamated association did not change through all of 1928. Owing to the multiplicity of labor classifications, general comparisons are indicated by the level of wages in reference to the base rate, which has not been altered in recent years. The wages in the November-December period of 1928 were 25½ per cent above base, compared with 28½ in November-December, 1927. In the same period of 1926 they were 33 per cent above base; in 1925, 32.5 per cent above; in 1924, 39 per cent above, and in 1923 they were 48 per cent above base. At the war-time peak they were 109.5 per cent above base.

Union Rates Slightly Higher

Union wage rates in 1928 were on the average slightly higher than in 1927, according to the annual survey recently completed by the bureau of labor statistics. The survey covered most of the time-work trades in 67 important industrial cities, and included more than 750,000 organized workers.

The average hourly rates in 1928



Employment conditions in more than 11,000 large manufacturing industries are represented in this chart, prepared from data compiled by the bureau of labor statistics

for all trades covered was $1.159, as compared with $1.154 in 1927, or an average increase of one-half of 1 per cent per hour. Of the 75 individual time-work trades covered by the survey, 53 showed increases in average wages in 1928, as compared with 1927, while the remaining 22 showed decreases.

The hours of labor, with an average of 44.9 per week in 1928, show a reduction of 0.5 per cent from 1927. The reduction in hours of labor has been almost continuous as the increase in rates per hour. In earlier years the decrease in hours was brought about mainly by reductions in those trades working more than eight hours per day or six days per week. Later the reduction was continued by more of the trades granting a short day Saturday, working five and one-half days per week, while now the reduction is brought about by the increasing number of trades working only five days a week.

Taken collectively, weekly rates in 1928 were 0.1 per cent lower than in 1927, 114 per cent higher than in 1917, 140.6 per cent higher than in 1913, 152.7 per cent higher than in 1910, and 162.8 per cent higher than in 1907. Because of the reduction of hours of labor, weekly rates failed to increase to the same extent as the hourly rates.

A slight gain is noted for 1928 in the composite of hourly wage rates in the building trades, expressed by index numbers, 1913 representing 100:

	Index numbers		Index numbers
1913	100	1921	200
1914	102	1922	187
1915	103	1923	207
1916	106	1924	224
1917	113	1925	233
1918	126	1926	248
1919	145	1927	257
1920	197	1928	258

A survey of wages paid in the building trades recently completed by the Building Construction Employers' association, Chicago, reveals $1.625 an hour as the maximum hourly rate. This rate is paid to electrical workers and plumbers in several cities. The bureau of labor statistics reports the average rate per hour for all workers in the building trades in 1928 as $1.33.

Total membership in all labor unions today by liberal estimation is 4,000,000. This includes the American Federation of Labor with its 2,812,407 members, the unions which are not affiliated with the federation, and the Workers, or Communist, party.

The total number of people gainfully employed in the United States is approximately 43,000,000. Excluding those engaged in agriculture and related lines, as well as those in professional and domestic service, some 26,500,000 persons remain in the organizable trades. Unions have a membership which represents about 15 per cent of those who are eligible for membership, and about 9 per cent of the people who are gainfully employed. Only 14 per cent of the manufacturing establishments in this country operate under closed shop conditions. This 14 per cent employs only 7½ per cent of the wage earners.

Advance in Union Molders' Wages

	Rates, 1914	Postwar Peak	Rates Dec. 31, 1928
BOSTON:	$3.50 for 9 hours	$7.20 for 8 hours 131.9% over prewar	$7.20 for 8 hours 131.9% over prewar
CHICAGO:	$4.00 for 9 hours	$8.40 for 8 hours 136.4% over prewar	$8.00 for 8 hours 125.2% over prewar
CINCINNATI:	$3.50 for 9 hours	$7.00 for 8 hours 125.5% over prewar	$7.50 for 8 hours 114.3% over prewar
DETROIT:	$3.50 for 9 hours	$8.50 for 8 hours 173.7% over prewar	$7.20 for 8 hours 131.9% over prewar
MINNEAPOLIS:	$3.50 for 9 hours	$7.20 for 8 hours 131.9% over prewar	$6.16 for 8 hours 98.4% over prewar
NEW ORLEANS:	$3.25 for 9 hours	$7.20 for 8 hours 149.3% over prewar	$6.40 for 8 hours 97% over prewar
NEW YORK CITY:	$3.75 for 9 hours	$7.04 for 8 hours 111.5% over prewar	$8.50 for 8 hours 154.6% over prewar
PITTSBURGH:	$4.00 for 9 hours	$7.50 for 8 hours 111% over prewar	$8.10 for 8 hours $102.5% over prewar
ST. LOUIS:	$3.50 for 9 hours	$8.00 for 8 hours 157.7% over prewar	$7.50 for 8 hours 141.3% over prewar
CLEVELAND:	$3.50 for 9 hours	$7.20 for 8 hours 131.9% over prewar	$7.60 for 8 hours 117% over prewar
INDIANAPOLIS:	$3.50 for 9 hours	$7.20 for 8 hours 131.9% over prewar	$7.50 for 8 hours 130.7% over prewar

Co-operation, for Mutual Help, Aids Industry

(*Concluded from Page* 12)

other company who is not equipped to furnish such engineering service or attempt to manufacture such machine in his own plant on designs furnished by the manufacturer of machinery."

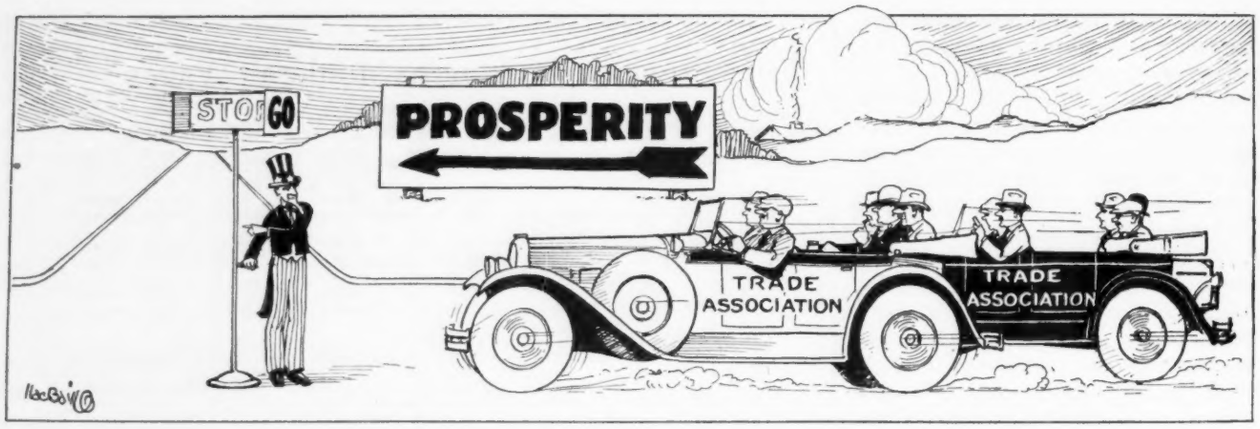
In February representatives of the same associations will meet at Washington to consider, among other things, such unfair competitive practices as inducing breach of contract, discrediting competitors, secret rebates and settlements, price discrimination, commercial bribery, fraud and misrepresentation, imitation of trademarks and names, enticement of employes, and use of inferior materials. Under the heading "uneconomic practices" are the topics; Free engineering service, unlimited maintenance service, unlimited guarantee, excessive allowance for "trade ins," and price-hammering and price-cutting. Once sellers undertake to combat these evils, plus the additional one of summary cancellations, selling will be elevated to a higher plane and buying accordingly.

Sellers have been unsparing in the past year in uncovering the sore spots in their phase of business intercourse. It is natural that in a buyers' market the heightened effort to sell should bring a train of evil consequences. But buyers are also alert to the situation, and last September when a representative group from both camps met a platform of sales and purchasing methods was adopted. This platform, which is given elsewhere in this article, stresses mutual obligations and recognizes the complementary character of selling and buying.

Not all sellers of steel are of the opinion that price is the chief point of contact between seller and buyer. Says one important sales representative:

"Confidence is the keystone of relations between producers and consumers of steel. To gain and retain confidence I regard the most important function of a salesman. With my larger accounts price is mentioned infrequently; there is the understanding that the price will be the going market. The evils of price cutting and excessive service and delivery requirements do not rear their head often where there is complete confidence and understanding."

One point is apparent in the effort to better the relations between sellers and buyers whether it be in machinery, steel or other products. Any concordat must be made between the executives of the two sides. The salesman seeking orders and the purchasing agent seeking low prices to make a good record are too close to the actualities of the situation to appreciate the higher ethics involved.



Legitimate business need fear no obstacles from Uncle Sam in 1929 on its journey toward prosperity

Industries Meeting New Competition with Better Trade Associations

Business Organizations Now Recognized as Legitimate and Powerful Influences for Collective Effort—More Than 1500 Functioning

By E. J. Ross

ALTHOUGH the first trade association in the United States dates back to the Civil war, it is during the last decade that organizations of this class have increased most rapidly in number and have had their greatest development. Today at least 1500 trade associations are in existence, of which about 700 are national and as such exercise influence in the control of business and continuation of prosperity.

Various definitions have been given for a trade association, but the one of greatest brevity and clarity is "an organization of business men in and serving industry for mutually helpful service and for better business."

Prior to 1921 the trade association movement had proceeded in a quiet way without attracting much attention from the public, but late in December the United States Supreme Court handed down a decision in the "hardwood" case which branded all open-price associations as unconstitutional. Immediately confusion arose and legitimate trade associations were confused with organizations functioning as price control bodies.

To clarify the situation and to inspire lawful organizations, Herbert Hoover, then secretary of commerce, in February, 1922, addressed a communication to Attorney General Harry M. Daugherty in which he defined the activities of trade associations and asked for an opinion as to their legality. In reply, Mr. Daugherty gave an opinion placing approval on Mr. Hoover's utterances. Those definitions, accepted today practically unaltered, gave to trade associations certain rights which briefly are as follows:

1. May advocate and provide for uniformity in the use of trade phrases and trade names by members.

2. May advocate and provide for the standardization of quality and grades of products of members.

3. May collect and furnish members credit information of those using products of the industry.

4. May arrange for handling insurance of its members.

5. May engage in co-operative advertising.

6. May engage in promotion of welfare work in plants of members.

7. May handle for and in behalf of members all legislative questions that may affect the industry.

8. May undertake for and in behalf of members promotion of closer relations between the industry and federal government.

9. May collect from members statistics on production, capacity, consumption, wages paid and distribution; may consolidate such reports; and may file with secretary of commerce for distribution to the members or to the public.

10. May at the time such information is selected have members report prices received for their products; may consolidate such reports; and may file with secretary of commerce for distribution to members and public.

On April 12, 1922, Mr. Hoover met trade association leaders in Washington to discuss the legitimate activities of trade associations and their relations with the department of commerce. At that time he definitely parted company with open-price associations. In July, 1923, the department of commerce published a comprehensive book on "Trade Association Activities." The appearance of this book was hastened by the Supreme Court decision of a few months previously on the "linseed oil" case which had developed threats of trade association legislation in congress. Mr. Hoover hoped to avert legislation and further acts of the court. He was successful in this, for in May, 1925, the Supreme Court, in handing down decisions on the "maple flooring" and "cement" cases, sanctioned trade association practice as "looking to the acquisition of wider and more scientific knowledge of business conditions."

For the past three years the beneficial activities of trade associations have firmly intrenched these organizations as essentials to modern business. In the 1927 edition of "Trade Association Activities," Mr. Hoover said:

"In the field of scientific and eco-

nomic research, in statistics, in simplification and standardization of commodities, in the promotion of arbitration in commercial disputes, in development of foreign trade, and in scores of other directions trade associations have made a most valued contribution to our economic progress. While our industry and commerce must be based upon incentive to the individual, yet the national interest requires a certain degree of co-operation between individuals in order that we may reduce and eliminate industrial waste, lay the foundation for constant decrease in production and distribution costs, and thereby obtain the fundamental increase in wages and standards of living."

Realizing that trade associations are serving a most useful purpose and will assume even more importance in the future, the Chamber of Commerce of the United States a year ago created a trade association department to give all of its time to the upbuilding and extension of trade associations in the industries of the country. At the head of this department was placed Dr. Hugh P. Baker, a man of wide experience in the field, having

CHARLES F. ABBOTT

Executive director, American Institute of Steel Construction which, as the leading pioneer of trade associations in the iron and steel industry, is effectively promoting the interests of structural steel fabricators

served for eight years as manager of the American Paper and Pulp association. In addresses before various industrial groups, Dr. Baker has said:

"A question often asked and not yet satisfactorily answered is whether business as represented in the manufacturing, distributing or retailing fields is functioning on the basis of a carefully prepared plan or program. Such analyses as have been made of certain of the industries, particularly as to distribution, would seem to indicate that as a rule industry is going forward in this country without a definite plan, without having worked out a program that has taken into consideration all of the factors of production, distribution, consumption, financing, etc. Progress is being made, however, toward a construction program in industry and there can be no doubt but that this progress has come largely as the result of trade association work.

"How, except through organized effort in the trade association can such fundamental economic and business problems as permanency of supplies of raw material, over-production, foreign competition, distribution and merchandising, elimination of trade abuses and other equally vital problems be met by industry on an effective basis? How, except through the trade association, can American business speak for itself?"

Some idea of the changed attitude toward trade associations was given on June 29, 1928, by Gilbert H. Montague, who is general counsel, National Welded Chain association, in addressing a national conference on sales and distribution. Mr. Montague said:

"A marked change in the attitude toward trade associations has come about in the past ten years. Formerly many of them were the objects of distrust and suspicion; the main purpose for their existence was supposed to be the fixing of prices and the exclusion of newcomers seeking to "break into" the business. Then problems arose in the economic life of the nation which directed attention to trade associations as best equipped to cope with them; problems of business ethics, of production, of unemployment, of manufacturing and distribution. It was seen that organizations of representative bodies could exert a beneficial effect on the conduct of trade and industry. The public viewpoint changed, and now more and stronger associations are indicated through common consent and judicial ruling."

One of the interesting developments in trade association work is the attitude of bankers toward manufacturing corporations which are affiliated with group organizations. One New York bank within the last three months carried in its advertising the statement to the effect that that institution preferred to loan money to manufacturers who were members of and participated in trade association effort. This attitude was forecast as early as December, 1926, by O. H. Cheney, vice president, American Exchange-Pacific National bank, New York, who said in addressing a meeting of the Sheet Metal Ware association:

"The time is not far when a business man's membership in trade associations will be an important factor in his banker's judgment of his credit rating. Trade association membership is a measure of character, because it shows the member's ability to get along well with others. Trade association membership is a measure of intelligence of the member's business methods because he is trying to eliminate competitive waste and to use co-operation as an economical promotion weapon against competitive waste in industry because it is doing something for the stability, efficiency and economy of production and distribution.

"By co-operation through sound, active trade associations, business could cut prices, not raise them. By co-operative study of the market, supply and demand operations could be

G. H. CHARLS

President, National Association of Flat Rolled Steel Manufacturers, which as the consolidated organization of sheet and strip mill interests is the first important trade association representing steel producers

stabilized. By co-operative research in production, costs could be cut. By using the money and energy now wasted in unnecessary competition, quality could be improved. The trade association is the hope of the consumer. . . . Only through them can there be better business men and better business."

Further convincing is the more recent statement of a New York banker who said:

"The time is coming when a bank's committee will ask of the applicant of a loan, 'Is he a member of a trade association?' In other words, is he going it alone, trying to meet this intensive age without help of his partners in the industry?"

Another banker takes a similar view, for in an address presented in October before the annual convention of the National Machine Tool Builders' association, H. I. Shepherd, vice president, Guardian Trust Co., Cleveland, made the following comment:

"The attitude of the banker to business has gone through as radical a change as any other business relationship. The same elements and conditions that make your business safe and profitable are the same elements

that make the banker's business with you safe and profitable. There is no longer one viewpoint of business for the banker and another for the business executive or operator. Safety, progress and profit in business demands that the conclusions of the banker and of his customer shall be based upon the same statement of facts, and reached by the same process of reasoning, and at this point, as much as any other place in business, there comes in the necessity of mutuality.

"It behooves every business or every association to employ the best talent in bringing forward for consideration the best and the latest in system and trade information. Bankers and business men alike have got to be abreast of the time. Obsolescence is as operative in brain power as in mechanical power. National trade associations should measure up to the demand and all members of these trades should keep abreast of the times, either by use of the facilities inside of their own organization or by those offered by the associations."

One of the solutions which has been offered for meeting the terrific competition of modern business is consolidation of smaller manufacturing units. That such a program does offer advantages is evidenced by the number of mergers which have been consummated in the last two years, but obviously all small manufacturers do not wish to nor could find it possible to become parts of larger corporations. These manufacturers must therefore avail themselves of every opportunity to improve production and selling methods if they are to continue and to expand. Affiliation with a trade association is without doubt the logical step. Commenting on this subject, Roger Babson, well-known economist, recently said:

"Consolidation is not a cure-all for mismanagement and inefficiency. The man at the head of the business is more important than the size of the business; that trade associations and other co-operative movements are already serving some of the purposes and affording some of the advantages to the small manufacturer that he feels he might get consolidation. My advice to the small manufacturer would be: first, to make full use of the information and help afforded by trade associations."

Likely it would be pointed out that the cost of trade association affiliation would be prohibitive to the small manufacturer. Investigation into this phase reveals that the financial obligation should be no heavier proportionately for the small interest than the large. The department of commerce finds that the share of the budget for which a member obligates himself is determined by some measure, such as sales, production or output, productive facilities of plant capacity, capital invested, raw materials used, employes, or payroll, which in the judgment of the industry or trade, is an equitable measure of ability to pay. The company which joins a trade association joins a voluntary group which is organized on the modern democratic principle of equal franchise and dues assessments according to ability to pay.

* * *

Gains Impetus in 1928

WHETHER because of the pressure of competition or for the reason that the example of successful organizations is more compelling than heretofore, the trade association movement gained perceptible impetus in 1928. In the metalworking industries a number of new organizations entered the field and several of those already in existence were merged or placed under new management.

ARTHUR J. TUSCANY

Secretary-manager, Gray Iron institute, which as the most recently formed trade association in the foundry industry, is attacking the problem of improving conditions for gray iron foundrymen.

The most important addition to the ranks of trade associations during the year was the Gray Iron institute, launched on a permanent basis on May 18 at a meeting held in Philadelphia during the convention of the American Foundrymen's association. The purpose of the institute is to promote sound business ethics, collect and distribute information relative to gray iron castings, study merchandising methods, promote uniformity in cost accounting, encourage research, stimulate use of gray iron castings and establish standards for castings. Officers of the institute are president, Walter L. Seelbach; first vice president, B. H. Johnson; second vice president, A. E. Hageboeck; treasurer, H. S. Chaffee; and secretary-manager, Arthur J. Tuscany.

Formation of the Gray Iron institute may be traced directly to the desire of influential individuals to construct machinery to make the gray iron industry articulate. It is expected that the organization will enable gray iron foundrymen to re-establish their industry on a basis of greater stability and to win greater acceptance for their product.

Another important development was the merging of the Cold Rolled Strip Steel institute, Hot-Rolled Strip Steel institute and the National Association of Sheet and Tin Plate Manufacturers into a single organization known as the National Association of Flat Rolled Steel Manufacturers. Since its reorganization, this association under the direction of G. H. Charls, president, has been actively promoting the interests of flat rolled steel producers. The merger was actuated by a desire to consolidate the activities of three groups whose problems were almost identical, due to the similarity of products.

Among the associations that have pioneered in the metalworking industries is the American Institute of Steel Construction. Its varied accomplishments in the few years it has been in existence have been recounted at numerous times in these columns. During 1928 its staff of field engineers fully demonstrated their value in promoting the interests of the structural fabricators by assisting builders in solving problems in connection with new construction. The institute renders a well balanced service for its more than 200 members.

Various consumer groups maintain active trade associations, among which are the Metal Lath association, Radiator Cover association, Metal Door and Trim association, Steel Furniture association, Metal Ceiling association, Pressed Metal institute and others.

Growth of trade associations in the metalworking industry during the past year has been along conservative lines. Producers and manufacturers, while recognizing more clearly than heretofore the benefits of organization, also have learned through experience that a successful trade association must be amply supported financially and capably managed. This realization seems to have retarded the one-time enthusiasm for organization on a shoe-string basis, and has introduced a gratifying note of caution against launching co-operative movements unless they are fully justified and adequately sponsored.

Research Is Chief Aid in 1928 To Engineering Progress

EACH new day provides additional proof of the efficacy of scientific research. Within the last decade the attitude of manufacturers toward the laboratory has gradually changed from that of doubtful tolerance to that of wholehearted acceptance.

The reason for this transition is found in the increasing returns from investments made in technical research. An analysis of the engineering achievements of 1928 reveals numerous instances of revolutionary discoveries which could not possibly have arrived at the stage of incubation this early had it not been for the groundwork laid years ago in what then appeared to be fruitless laboratory routine.

Another significant commentary on the wisdom of systematic research is furnished by the numerous contributions to technical advancement by companies such as the General Electric Co., Westinghouse Electric & Mfg. Co., Western Electric Co., American Telephone & Telegraph Co., Union Carbide & Carbon Corp., Aluminum Co. of America and others conducting investigations in pure science, and the much smaller measure of accomplishment reported by the companies which have not yet engaged in research in a serious way. An encouraging development in this connection is the recent but belated awakening of the United States Steel Corp. and other steel producers to the valuable insurance afforded by regular and consistent research activities.

Among the notable achievements of 1928 attributable to research was the announcement during the midyear of a new carbide-tungsten tool material, which according to one of its sponsors "raises the cutting ability of the cutting tool by one whole order of magnitude above high-speed steel." Tests made subsequent to this announcement confirm the early claims for the new material and open anew the dormant rivalry between materials to be machined and the ability of tools to machine them. This race involves the design of machine tools and undoubtedly will influence not only the details of machine shop practice but also the selection of materials for machinery and engineering construction.

For the most part, technical advancement during the past year has taken the form of refinements in equipment and methods. In blast furnace, steelworks and rolling mill engineering, the notable improvements have been in accessory equipment and in details of practice, the results being increased efficiency of operation and the promotion of safety. The newly announced electrically-operated mud gun, refinements in open-hearth combustion control and further adaptation of the principle of continuous rolling are examples of what is transpiring in the production division of the steel industry.

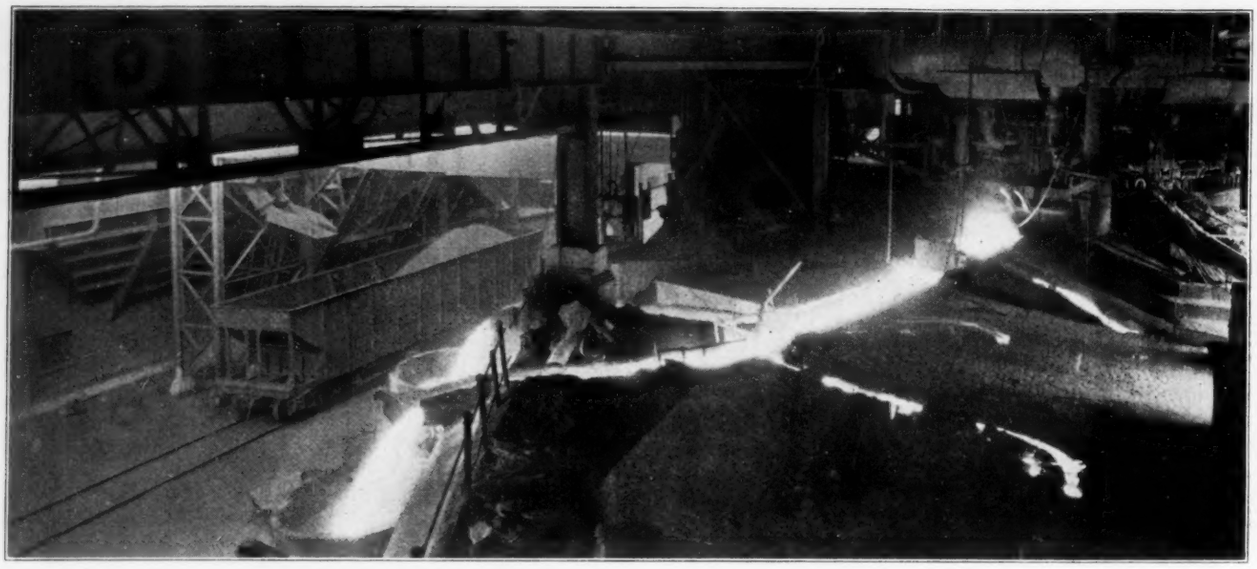
In the fabrication and treatment of steel, the notable advances include important new data on the application of welding, development of improved methods for fabricating columns by riveting and widespread recognition of the possibilities of the nitriding process of hardening steel.

The foundry industry has profited handsomely from its investment in research, chiefly in improved physical properties of gray iron and steel, in more accurate knowledge of the limiting factors in the annealing of white iron for malleable, and general improvement of nonferrous metallurgy.

Leading Authorities Present Views on Achievements of 1928

A YEAR ago, in presenting its annual analysis of engineering progress in the metalworking industries, IRON TRADE REVIEW *departed from its usual procedure and instead of publishing the opinion of one authority on achievements in each technical branch, recorded the views of many. The success attending this plan was so gratifying that it has been adopted again for this year's analysis. More than 50 of the country's leading engineers, metallurgists and operating officials have contributed their opinions as to the significant advances of the past year. The result is an accurate, composite picture of technical development. Again* IRON TRADE REVIEW *takes pleasure in expressing its appreciation and acknowledging its indebtedness to the contributors to the following pages for the success of this second cooperative analysis of American engineering achievement.*

—THE EDITORS.



Enlargement of blast furnace lines in 1928 at various plants afforded greater output of hot metal

Improved Practice and Equipment Mark Blast Furnace Advance

ADVANCEMENT in blast furnace practice during the year just closed was marked by a radical change in the practice of closing the iron notch through the use of an electrically-operated mud gun of the rotary type. This unit developed by John C. Hopkins, superintendent, Central Furnace, American Steel & Wire Co., Cleveland, and William Johnston, vice president, William M. Bailey Co., Pittsburgh, has aroused the interest of furnacemen as one of the few accessories recently devised that affords a large increase in tonnage.

The apparatus consists of a heavy steel plate carriage on which are mounted the gun proper, the clamping and elevating mechanism and the unit for swinging the gun over the iron trough. The carriage is suspended from a pedestal which turns on ball bearings. A 40-horsepower motor at the rear of the mud barrel is coupled through reduction gears to a set of screws which revolve toward each other. The mud barrel is equipped with a hopper and an extension of sufficient size to hold 2½ times as much plastic clay as the ordinary steam gun. In addition to the gun motor, the machine is equipped with two others, one for swinging the carriage over the runner and one for directing the nozzle of the gun into the notch and for clamping the entire unit to the hearth jacket of the furnace.

Once the gun is coupled in place the screws within the barrel are actuated and the clay is forced continuously into the iron notch at a nozzle pressure of 410 pounds per square inch. While many benefits are derived from the use of this gun such as a constant supply of gas to the stoves and boilers, less flue dust and continuous movement of stock in the furnace, perhaps the most important advantage is that the notch can be plugged without removing the blast. The significance of this statement may be realized by the results of an investigation conducted at a merchant stack burdened on foundry iron where a rotary gun is used to stop the notch. The furnace is taking one more round a cast than it did when the hole was plugged with the old type steam gun. The gain of six extra rounds a day is equivalent to 9660 tons annually based on a 345-day year and has a market value of $173,880 based on the present quotation of $18 valley furnace. A detailed description of the gun appeared in the Dec. 20, 1928, issue of IRON TRADE REVIEW.

Charge of clay from rotary-type gun

Another piece of equipment developed last year is a cooling plate which differs from conventional design inserted between the brick work of blast furnace boshes. The layout of the plate, which was designed by the engineering department of the Ford Motor Co., provides a double or duplex arrangement. A partition divides the plate into an inner and outer compartment. The water upon entering the outer compartment flows along one side to the nose thence across to the opposite side and returns to the place of the plate but instead of being discharged it is piped to the inner compartment. Should a portion of the nose of this particular type plate be melted off while in service, the inlet water connection may be reconnected to the inner compartment, thus maintaining the cooling effect as before and avoiding the total loss of the plate. In flushing bosh and mantle plates, pressure water may be maintained on one compartment at the same time as the other compartment is being cleaned. Comment-

(*Concluded on Page* 22)

Better Control Typifies Furnace and Mill Progress in 1928

REFINEMENT of the present type open-hearth furnace rather than the development of a unit designed along different lines continues to occupy the attention of steelmakers. Larger furnaces are being operated to secure maximum output. A year ago marked the completion of a stationary furnace tapping 250-ton heats; during the year just closed stationary furnaces capable of producing 300 tons of basic steel were operated.

Pig iron with a high manganese content is finding a wider use in basic open-hearth practice. Reports from various open-hearth superintendents are to the effect that the bath shapes up quicker, the quality of the steel is improved and on account of greater uniformity in the physical properties the amount of rejected steel has subsided.

Commenting on recent advancement in open-hearth design and practice, L. F. Reinartz, assistant general superintendent, American Rolling Mill Co., Middletown, O., points to a fuller realization of the value and the necessity for better combustion control and an increasing desire on the part of operating men to conserve fuel by more careful insulation of the furnace. In attempting to obtain this proper control of the furnace, blower fans have been installed on the air intake side of the furnaces and various methods have been tried for increasing the stack draft of the furnace.

From a metallurgical standpoint, steel plant operators are realizing more every day the necessity for accurate chemical control and better knowledge of the reactions that are taking place in the furnace between the slag and the metal.

The most outstanding achievement in open-hearth design as expressed by C. H. Herty Jr., supervising metallurgist, metallurgical section, bureau of mines experiment station, Pittsburgh, is the use of the balanced draft with recording instruments on the waste gases, which has unquestionably increased production and cut down fuel consumption to a far greater extent than any other invention of recent years.

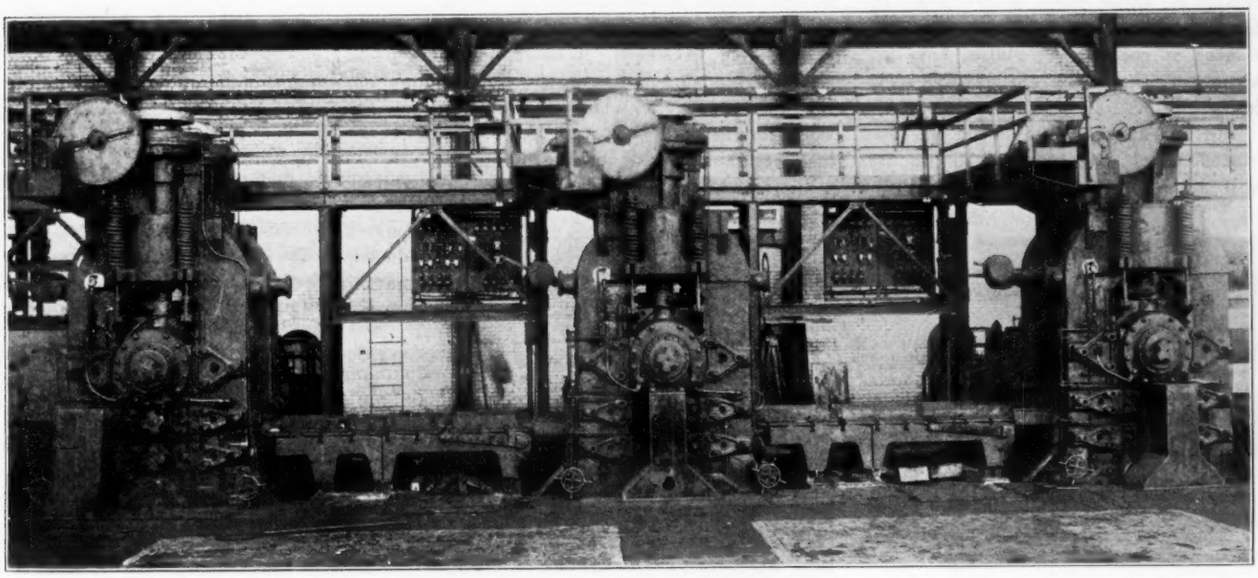
Employs Special Checkers

Mr. Herty points to the use of special checkers as an outstanding development. As far as quality of output is concerned, Mr. Herty explains, "I do not believe that we can point to any particular achievements but rather to a general realization by open-hearth men that proper slag conditioning, proper deoxidation and proper use of raw materials, will increase the quality of steel more than anything else. The fact that certain pig irons should not be used in certain types of steel is a thought which has been in the open-hearth man's mind for a long time but which has been well crystallized within the last year.

"Lighter gases, such as a mixture of blast furnace and producer gas, are being developed for melting open-hearth charges at one plant but the benefits will not be available until well into 1929."

* * *

IMPORTANT developments and installations in steel rolling mill plants during 1928 have been made in the secondary or finishing mills rather than in extension of the primary mill capacity. This is the consensus of opinion of various rolling mill engineers and authorities on rolling mill technic obtained by IRON TRADE REVIEW. A. F. Kenyon, general engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., states that many plants have directed their efforts toward reduction in production costs by the electrification of existing mills and by the installation of improved types of mills to supplement or replace older high cost mills. Development, he points out, has gone on rapidly in the design and arrangement of the so-called tandem type of continuous mills for the production of strip, merchant and other shapes. The use of separate adjustable-speed motor drives on each of the mill stands is becoming increasingly favored as it allows the utmost latitude in making up rolling schedules and also permits easy control of the mill during rolling. Direct-current motors are considered almost standard for such mills and numerous



Individual drives for tandem mills have contributed to better production, efficiency and quality of output

refinements in motor and control designs have been achieved.

During the past five years radical changes have been made in the practice of producing wide thin sheet for strip material. The newly evolved practice requires a continuous or tandem type of mill, consisting in most cases of from ten to twelve stands in which slabs from 3 to 6 inches thick and nearly a ton in weight are reduced to 14-gage and in some instances to lighter gages of strip steel entirely without manual manipulation and without reheating, at the rate of from 50 to 200 tons an hour. It is evident that such continuous production methods have effected important cost reduction, because of the greatly increased output, low labor requirement and heating and handling economies.

Synchronous Motors Favored

Mill operators now are giving favorable consideration to the use of synchronous motors on many types of installations. As recently as five years ago, states Mr. Kenyon, there were but three main rolled synchronous motors in operation; at present, there is a total of about 65 such machines of a combined capacity of nearly 100,000 horsepower. More than one-fourth of this total synchronous motor capacity of steel mill main roll drives was furnished by one manufacturer during the first eight months of 1928.

Of interest because of their unusually large size are two 5000-horsepower synchronous motors now being furnished to the Columbia Steel Corp., Pittsburg, Calif., to drive continuous sheet, bar and billet mills. The stator frames are about 26 feet diameter. The frames, rotor spiders, brush holder rigging, bed-plates and practically all other parts with the exception of the bearing pedestals, are fabricated of rolled steel plates, bars and structural shapes by electric arc welding.

During the year just closed the Gulf States Steel Co. modernized its rod mill by replacing the steam engine drive with five synchronous and one direct-current motor. This is the first application of synchronous motor to a rod mill.

For the electrification of its 40-inch blooming mill, the Youngstown Sheet & Tube Co. has purchased a 7000 horsepower single-unit reversing motor equipment. The stator frame of the reversing motor, weighing more than 20 tons, will be formed of rolled slabs, bent to the required circular shape. Many of the other parts of the equipment will be fabricated of rolled steel shapes by electric arc welding.

No outstanding development has made possible increased output of mills, according to W. W. McBane, sales engineer, United Engineering & Foundry Co., Pittsburgh, but many detailed refinements have assisted in obtaining this result. The increased use of both mechanical and electrical equipment for manipulation and handling have permitted the use of increased rolling speed and prevented delays, so that both the per man and per hour products have been increased.

Features that have contributed largely to the betterment of production, efficiency and quality of output have been in connection with the strip, hoop and band mill, declares O. Needham, assistant superintendent, testing department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This has been due to the extension of the use of individual drive by electric motor of each stand of tandem arrangement; and, also to the use of 4-high and roller bearing stands.

Continuous pack heating furnaces and mechanical catchers, which permit an increased output per sheet mill with a reduced crew, constitute one of the recent developments in rolling mill practice, as expressed by R. J. Wean, vice president, Aetna-Standard Engineering Co., Youngstown, O. During the past year what is known as the "double mill" system has come into common use at high-grade sheet mills which means that the roughing mills are operated by one crew and the finishing mills by another, so that all mills are operated as near 100 per cent of the time as heating and mill conditions will permit.

In the manufacture of seamless tubing it has been difficult and expensive to make sizes smaller than 2½ inches outside diameter. During the year just closed, however, a new mill has been designed with three rolls in the same plane in each housing. Each roll encloses 120 degrees of the circumference of the tube. Roll stands are practically alike with the exception that the roll essentially is shifted 180 degrees in each succeeding stand.

Blast Furnace Advance Is Noteworthy

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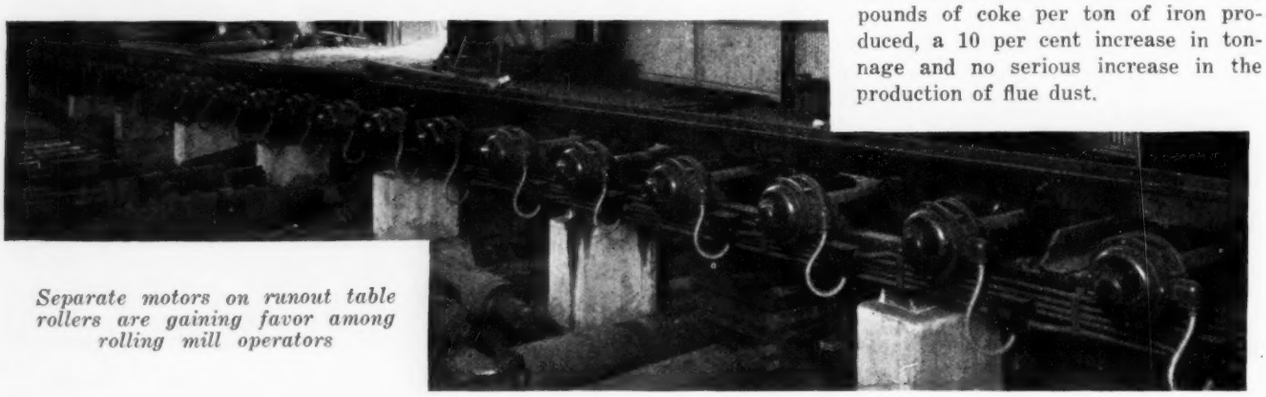
ing on blast furnace advancement J. S. Fraser, resident manager, the Trumbull-Cliff Furnace Co., Warren, O., believes further increasing of blast furnace hearth and bosh dimensions with its associated increase of volume in furnaces, thereby materially increasing production continues to be an outstanding achievement.

The outstanding achievement in blast furnace practice in this country last year, in the opinion of R. H. Sweetser, assistant to vice president, American Rolling Mill Co., Columbus, O., was the widespread realization by executives and operating managers of the possibility of greater throughput with the existing blast furnaces.

Progress in blast furnace construction and operation, as expressed by W. A. Haven, superintendent of Northern furnaces, Republic Iron & Steel Co., Youngstown, O., has included larger furnaces; higher heats; the use of sintered materials; better types of tuyeres, mud guns and other auxiliaries; and improvements to gas cleaning and burning equipment. The most promising new development in 1928 would seem to be the crushed ore test made at a furnace in the Birmingham district, which is said to have accomplished a reduction of 350 pounds of coke per ton of iron produced, a 10 per cent increase in tonnage and no serious increase in the production of flue dust.



Separate motors on runout table rollers are gaining favor among rolling mill operators

Trend in the American foundry industry is toward continuous operation with larger tonnage from small units

Necessity Spurs Foundry Industry To New Research Activity

COMPETITION, extremely keen in the foundry industry for several years past, has served as a spur to technical advance. Adversity has acted as a stimulant. A closer drawing together is noted in all branches of the foundry industry and more particularly among gray iron castings manufacturers.

S. W. Utley, Detroit Steel Casting Co., Detroit, past president of the American Foundrymen's association, believes that the two outstanding developments of 1928 in the foundry industry, bearing directly upon technical events, have been the formation of the Gray Iron institute, a trade association of gray iron foundries, and the appointment by the American Foundrymen's association of a committee to promote greater use of castings.

E. J. Lowry, Detroit, a consulting engineer in foundry practice, states that the production of high test cast iron is a marked trend in the industry. Attainment of higher physical qualities through the use of alloys, notably chromium, nickel, molybdenum, have served to broaden the service of gray iron. Similarly, R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee, draws attention to the inadequacy of present specifications for cast iron. Some two years ago Mr. MacPherran received a comment from a European technician pointing to the 28,000 pound per square inch specification for so-called high-test iron. Recently Mr. McPherran's company produced a 3-ton casting which showed a tensile strength of 62,500 pounds per square inch in a test specimen cut from a 1.75 inch casting. This is by no means exceptional but represents what may be attained in this metal.

Dr. Richard Moldenke, Watchung, N. J., states that the tendency of foundries is toward continuous operation with greater tonnage produced from smaller units. This has led to boldly planned and seriously executed mechanization of foundries. Indirectly, it has induced consolidations to provide larger liquid capital by which this mechanization is rendered possible. Similar observations were made by W. L. Seelbach, Forest City-Walworth Run Foundries Co., Cleveland, president of the Gray Iron institute, and Arthur J. Tuscany, manager of that organization.

In the steel foundry lines, Maj. R. A. Bull, director, Electric Steel Founders Research Group, Chicago, says:

"Probably the greatest progress made by the ferrous foundry industry during 1928 was in (a) developing special steels by means of composition and heat treatment; and (b) originating alloy cast irons for purposes requiring hardness, stiffness or strength without appreciable shock resistance, and improving manufacturing methods for these, to eliminate the variable nature of some pioneering results."

A. H. Jamieson, Deemer Steel Castings Co., New Castle, Del., calls attention to the formation of the Steel Castings Development Bureau comprising eight independent steel foundries, representing all three of the common steelmaking processes, namely, open hearth, electric furnace and converter. These companies, although competitors, are combining through the establishment of a central office under a research director and with the services of research associate at the United States bureau of standards to improve their technical processes and the quality of their product.

The steel castings industry has made marked progress in the elimination of waste and in consequence has produced steel castings more economically, according to W. J. Corbett, manager, Steel Founders Society of America, Pittsburgh. Many companies have installed labor-saving equipment which gives improved control of production and better quality.

The malleable castings branch of the foundry industry, composed of large organizations, long has occupied an advanced position in foundry practice. H. A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, comments in detail upon advances which have been made during the past year. He says:

"Two or three concerns have started to operate a combination of a cupola and an air furnace with or without the use of a converter, making malleable by duplex or triplex process without the use of the electric furnace. The development is interesting, but so far nothing has appeared permitting one to judge of any superiority it may have over the more common procedure.

"The problem of accelerated annealing has received continuous and intensive attention. There has probably

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New Cutting Alloys To Revolutionize Machine Tools?

Design Will Be Greatly Affected, Experts Believe—Refinements in Antifriction Bearings, and Improved Lubrication

Turnings from nickel steel cut by new tungsten-carbide-cobalt cutting tool

PERHAPS the outstanding development in machine tool circles for the year 1928 was the practical introduction in the latter part of the year of new cutting alloys which, in the opinion of many builders and users, will revolutionize future machine tool design and operation. Notable among these new alloys is the tungsten carbide-cobalt alloy of which Dr. S. L. Hoyt, General Electric Co., Schenectady, N. Y., responsible for its development, says: "it raises the cutting ability of the cutting tool by one whole order of magnitude above high speed steel."

E. F. DuBrul, general manager, National Machine Tool Builders association, Cincinnati, is convinced that the practical application of these new alloys will mean that "machine tools will embody more in the shape of antifriction bearings, lubricating devices and greater weight necessary to absorb the cutting strains and stresses." Mr. DuBrul continues:

"All of that means naturally a heavy expense of redesign and a corresponding increase in the price of the machine. On the other hand, the user will receive from the hands of the builder a machine that will do much more work within a given floor space and with minimized human attention.

"In many cases the new alloys, no matter what their cutting possibilities, can add nothing more to the present design, because various machines of recent designs, equipped with automatic work feeding devices, now are limited in their production to the ability to feed the machine.

"The new cutting materials promise to be of great assistance even on machines of present designs. As a sample, pieces are made on automatic lathes that have stems and flanges. If the machine is speeded to the full cutting ability of high speed steel tools working on the flanges, the peripheral speed of the stem part is beyond the cutting ability of the high speed steel tool. The same, of course, would exist if the whole machine were speeded up and new cutting alloy tools were used on both stems and flanges, so in these cases the obvious solution would be to use the high speed steel tool on the flange working to its lathe, and to use a tool tipped with one of the new cutting alloys on the stem parts."

Bearing Refinements Made

Further strides have been made in the application of ball and roller bearings to machine tools. This is a feature of design which appears to have almost universal sanction of those connected with the industry. J. R. Weaver, superintendent, manufacturing equipment department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., comments upon this development:

"The decided trend to eliminate the sleeve bearing and substitute either ball or roller bearings undoubtedly is a great advantage due to the fact that less power is used and a much more rigid machine can be developed because with either the ball or roller bearing a minimum of clearance is necessary while with the sleeve bearing a certain amount of clearance is compulsory due to lubrication."

Mr. Weaver believes that "the present design concentrating upon lubrication of one source to feed all the bearings by forced lubrication is a decided advantage and should be carried out to the fullest extent. It is a known fact that under the present-day pressure of production, the workman often forgets to oil up his machine and the oil holes are not properly covered up and dirt is allowed to enter the bearings. With the central forced lubrication system this is eliminated.

A somewhat humorous expression of opinion on the lubrication problem is voiced by F. W. Stein, methods engineer, Fairbanks, Morse & Co., Beloit, Wis., as follows:

"The lubrication problem has not been solved although much has been done toward its solution by leading makers. Some machine designers give no thought to the accessibility of oilers and it sometimes takes a Sherlock Holmes to find them, they are so small. We often find a 10-cent oiler on a $5000 machine."

Mr. Stein has several other interesting comments on the machine tool developments during 1928. He continues:

"One of the greatest problems is to keep machines clean. The enclosing of all mechanism and elimination of pockets and recesses on exteriors does much toward helping this situation. Newer machines reflect considerable thought given to outward appearances.

"Few machines have the ways protected in any manner from chips, workmen's tools and material. This is a problem which should be given much more thought. Increased attention being given to the health of workers and shop cleanliness will make it necessary to provide for some method of chip and dust removal on cast iron work. I would hazard the suggestion of providing a built-in vacuum system with the nozzle at the cutting tool.

"Great improvements have been made with regard to rigidity of machines but within the next few years the more general use of the new cutting materials, I believe, will call for the entire redesign of present machines to secure higher cutting speeds and more power."

Further application of hydraulic feeds to various machines has come about in

the past year. J. Q. Salisbury, supervisor of machining and tool division, National Cash Register Co., Dayton, O., states that the use of hydraulic table feeds on cylindrical and surface grinders has been particularly beneficial to his company and that improved results are expected from the use of hydraulic table feeds on multiple spindle drills. Mr. Salisbury sees some obstacles in the paths of machine tool builders, however, which, in his opinion, must be surmounted. He says, in part:

"One of the problems yet to be overcome by the builders of machine tools is the development of equipment along two separate lines. The manufacturers of heavy parts have been taken care of fairly well. This has not been the case with the manufacturers of small intricate pieces. There has been a noticeable lack of development in semi-special machines such as two and three-way drillers, special grinders, profilers, etc., suited to the smaller size parts."

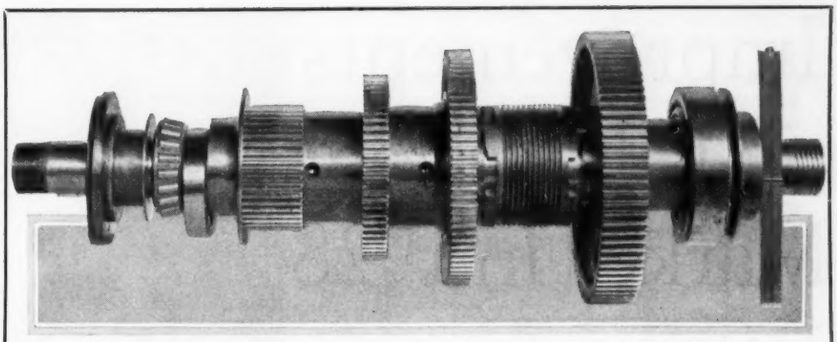
Progress Is Slight

That the year 1928 brought no single outstanding development in the machine tool industry but rather an enlargement of endeavors of the two or three preceding years, is the contention of Max Sklovsky, chief engineer, Deere & Co., Moline, Ill. According to Mr. Sklovsky, progress has been most marked along the lines of increasing use of ball and roller bearings and hydraulic feeds, and the simplification of control of operating parts. Commenting on these developments, he says:

"Quick change in feed speeds and the rapid return which hydraulic feeds bring about permit users of such machines to obtain greater output, using greater feeds and speeds, and with it a reduction in the loading time of parts.

Echoing the sentiments of the others, A. B. Bolender, tool supervisor, Warner Gear Co., Muncie, Ind., sums up the situation as follows:

"Application of hydraulic feeds to a variety of machine tools is one of the most important developments of the past year and, in fact, the last three years. There is plenty of room for applying this principle to other machine tools than have been so equipped already. Lubrication problems have been solved fairly successfully; however, forced lubrication to all bearings and surfaces to which it can be applied commercially is most desirable. I consider that the use of ball and roller bearings will become more general as this is a noticeable improvement over the old friction-type of bearing. Great strides have been made along the lines of increased life of machinery, less cost of upkeep and increased productive capacity—all desirable improvements."



Spindle for geared head production lathe, equipped with precision-type roller bearings

John C. Hanna, chief engineer, Hanna Engineering Works, Chicago, surveys the developments of the past year as follows:

"One of the most interesting phases of development is the shop operations or processes which have been used this year to such greater extent as to portend still greater use in the future. Some such metalworking operations which are worthy of mention are old and have long been understood and appreciated generally. Their recent prominence is sometimes due to new machine tool development as in the case of machine lapping of flat and cylindrical external surfaces."

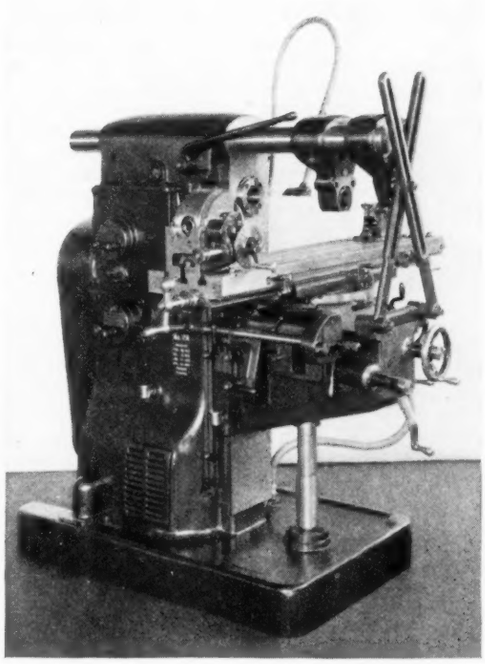
Various Materials Available

Never, in the opinion of Mr. Hanna, has the machine tool designing engineer been confronted with a greater number of and variety of new materials of construction for assimilation in his past and present designs. He continues:

"Heat-treated steel castings of high carbon content and others which are highly alloyed, nitrided steel, chromium plated steel, alloyed cast iron, new nonferrous alloys and others serve to illustrate the point. It seems more desirable than ever before that the maintenance cost of machine tools be decreased. Interchangeable manufacturing methods in the machine tool building shop are progressing.

"Hardened and ground ways of machine tool seem to be taking a firm foothold in design. Ways and means for adapting standard machine tools to jobs for which special single purpose tools have been used are being worked out with marked success. Some reliable method for shortening the time for seasoning castings of machine tools would be of inestimable value both to builder and user.

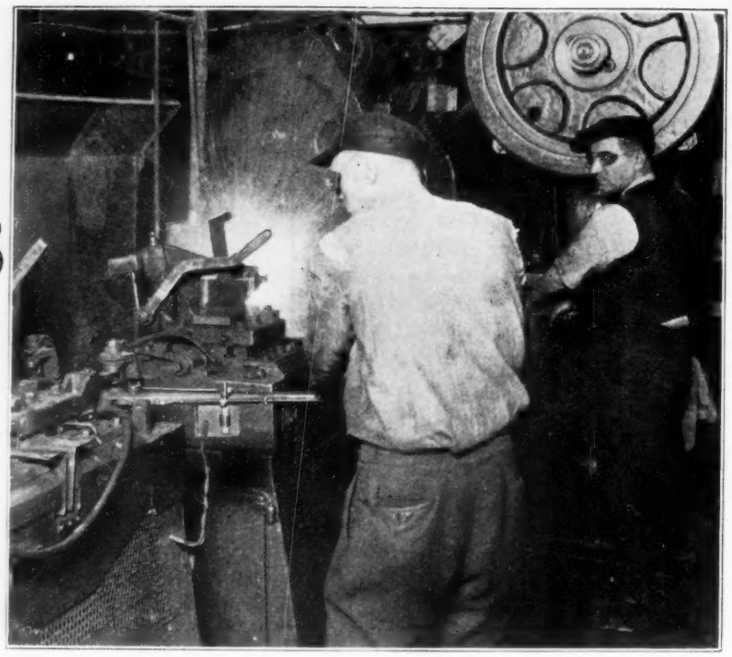
"An increasing number of leading machine tool builders designs and builds the jigs and fixtures to be used on their machine tools. I believe this is eminently as it should be. Fixture design always has lagged behind the machine tool in the march of progress. Tools and fixtures are worthy of the same painstaking and comprehensive design and manufacturing effort which is applied to machine tools. The users and builders of machine tools both will profit by the experience gained by the builder in tooling his machines. The art will advance more rapidly."



MILLING machine which embodies several modern features of design; antifriction bearings for feed, speed and power, fast travel transmissions; heat treated alloy steel gears, and forced feed lubrication in knee mechanism

Improvements in Fabrication Marked in 1928

Adoption of Refined Methods of Welding and Greater Flexibility in Equipment for Riveting Aid Fabricating Industries



Welding is playing an increasingly important role in fabrication of automobile parts

WELDING as a fabricating method has enjoyed remarkable growth during 1928, according to opinions voiced by engineers in this field. Bridges, hotels, office buildings, pipe lines, tanks and retorts, electric motors and other equipment, all are examples of successful applications of welding processes. Over 5000 miles of welded pipe lines have been assembled during the year. A 12-story hotel in Hot Springs, Va., and the Upper Carnegie building in Cleveland are notable instances of the adaptation of welding to buildings. Hand in hand with this development has been progress made in riveting equipment and methods. It has been estimated that over 400,000,000 rivets became integral parts of the structural steel tonnage for 1928. Cold riveting is considered to be a promising possibility for the future reduction of fabricating costs and has had widespread popularity in automotive construction.

"Remarkable progress," states W. Spraragen, technical secretary, American Welding society, "has been made in replacing other materials by welded steel parts. Many large machines produced by manufacturers of electrical machinery are being fabricated by welding structural steel parts with considerable economies. Welding now is being used in fabricating high-pressure superheated steam lines in power lines plants. Hundreds of miles of gas lines in oil fields, consisting of steel pipe 8 to 24 inches in diameter, are being welded both longitudinally and radially, while the welding of airplane fuselages is becoming standard practice in many localities."

G. O. Carter, consulting engineer, Linde Air Products Co., New York, comments on the fabrication of pressure vessels by oxyacetylene welding:

"Fabrication of pressure vessels by oxyacetylene welding is not a new thing, but has been extended materially during the past year. One impressive welded equipment was a complete creosoting unit, comprising two retorts 90 feet long and 90 inches in diameter and 1-inch thick, designed for 200 pounds working pressure under steam pressure. With this were several other pressure vessels all tested at 400 pounds pressure when they were subjected to impact tests and at 600 pounds pressure with hydrostatic tests. This equipment, which has the unique feature of cast steel ends welded to forged steel shells, has been in service for practically the entire year."

Mr. Carter considers that important progress has been made in the development of welding. He continues:

"Executives are becoming convinced more and more of the suitability of welding when handled under proper control. In fact, many engineering bodies have acknowledged during the past year that it is no more difficult to control welding properly than to control any other mechanical process. Welding must be controlled from the point of view of correct design for welding, the use of correct materials, having qualified operators to do the work and subjecting the finished product to a suitable test."

The use of welding in airplane manufacture is cited by S. W. Miller, consulting engineer, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y., who mentions the interesting fact that "in 1921 only 302 airplanes were made in this country, and they were practically all of wooden construction. In 1927 there were 2353 made, and in 1928 the production probably will be over 6000 and about 90 per cent of these will have important parts welded."

New welding processes, notably the atomic hydrogen process and the so-called electronic tornado process or automatic carbon arc welding, have been introduced. Robert E. Kinkead, consulting engineer in arc welding, Cleveland, holds that these processes "were such improvements over anything that had been done previously in arc welding that it has taken considerable time to make the commercial applications which were possible because of these improved methods of welding." He says further:

"However, now that the principles of the new processes are understood widely, their defects and advantages are being rated properly, and it may be prophesied with safety that modifications of these processes will be made which will make them adaptable to a much wider range of manufacturing operations."

Mr. Kinkead estimates that at present the electric arc welding business amounts to about $10,000,000 per year. He sees a particularly bright future for the industry, predicting that "when the arc welding has been fitted into the industries of the country in such a way as to obtain greater certainty of results than has been shown heretofore, then the arc welding business may become a business which will involve thirty to forty million dollars each year."

Two major developments in welding machinery are noted by J. F. Lincoln, vice president, Lincoln Electric Co., Cleveland. Of them he says:

"First, the development of the electric tornado method of automatic carbon arc welding; and second, the development of a commercial high speed metallic electrode.

"The first of these developments has made possible the increase in speed of arc welding to several times what it has been before. The second, I believe, has made possible the increase of speed of metallic manual welding by the same proportion."

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., completed a large 100,000 kilovolt-ampere generator with an all arc welded frame, which was built and shipped in one piece due to the decreased weight made possible by the welding process. The welded frame weighed 52,000 pounds, whereas a cast frame would have weighed nearly 85,000 pounds. Commenting on this development, A. M. Candy, engineer, arc welding department of the Westinghouse company, says:

"Use of steel plate and shapes and bar stock for the manufacture of electrical apparatus has increased so rapidly that even though this work has been going on for only about two years, we are now consuming steel at a rate of approximately 1000 tons per month. This is an appreciable figure and undoubtedly will be increased rapidly during the next year."

As in any infant industry, certain problems are bound to arise which demand solution if the industry is to prosper. Mr. Candy gives his opinions on some of these problems as follows:

"Three possible problems which as yet have been unsolved are: First, production of electrode material for welding which will have a zero temperature coefficient and would, therefore, set up a minimum amount of shrinkage strain upon cooling; second, the development of electrode material and welding technique which will produce weld metal having as great ductility as that of our usual rolled steel material; and third, the development of a nondestructive testing method so that, where desirable, finished welded joints can be checked readily by means of an instrument to determine the soundness of the welded connection."

The nondestructive test method, of course, always has been a much desired need; but as yet no satisfactory system appears to have been devised. Meril L. Eckman, welding department, Ford Motor Co., Detroit, suggests that the development of the X-ray into a readily utilized, quick and practical method of inspection of welds would be a "wonderful achievement." He continues:

"The great problem confronting welders is to make people welding-minded, that is, so that they will know just what can be welded and what cannot. Two pieces of crooked, irregular stock or shapes cannot be joined by welding so that they will be straight and regular afterward. Likewise pieces of low carbon steel do not have the strength of vanadium steel after welding; nor does cast iron become malleable after welding."

"The outstanding need in furthering the proper use of fusion welding lies," according to Eric H. Ewertz, consulting engineer, 50 Church street, New York, "in the education of our designing and supervising engineers to a proper realization of the value of these new tools and their peculiarities." Mr. Ewertz continues:

"Fundamental consideration of the result desired and harmonious combination of suitable units so combined by welding as to obtain a lighter and simpler structure with the required strength and containing no undue heat stresses is now within the reach of our trained engineers.

"The average result produced by carefully trained and tested welding operators, reduced by the usual margin of safety of four or five, places welding now on the same relative basis as other known methods of uniting metal parts, providing that the design and related conditions are sound."

James W. Owens, director of welding, Newport News Shipbuilding & Dry Dock Co., Newport News, Va., visualizes several problems of a slightly different nature. He writes:

"Among the many problems yet unsolved is the development of an electrode for manual metal arc welding which will make ductile welds of high tensile strength, free from porosity, at a high deposition rate and in any position. Insofar as the development of proper tests is concerned, considerable progress has been made in the selection of welders on the basis of test specimens."

Robert Siemer, general manager, Allan Mfg. & Welding Co., Buffalo, adds his opinions to those already stated:

"To my way of thinking the greatest problem yet unsolved in the welding industry is the inability to test the welds, to know whether or not the deposited bead, or metal, is sound or unsound. At the present time we have to rely to a large extent upon the human element; of course, there are semiautomatic and full automatic welding devices that eliminate the guess work to a certain degree, but some type of instrument must be developed that will indicate the density of the deposited metal, showing whether it has fused solidly and whether there are any voids."

Some method for testing welding wire is deemed essential by C. A. McCune, director of research, American Chain Co., Bridgeport, Conn., who states that:

"The flame test by which the wire is melted to reveal gases, etc., is a simple shop test and indicates whether or not the wire is a suitable one.

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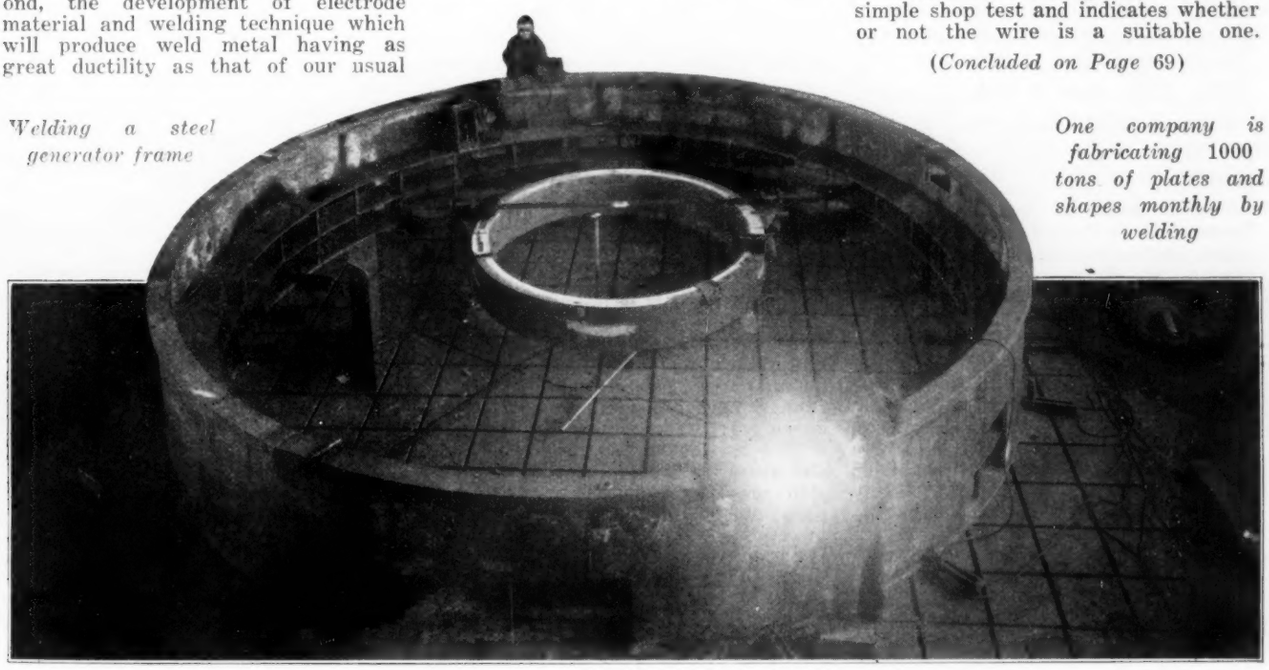
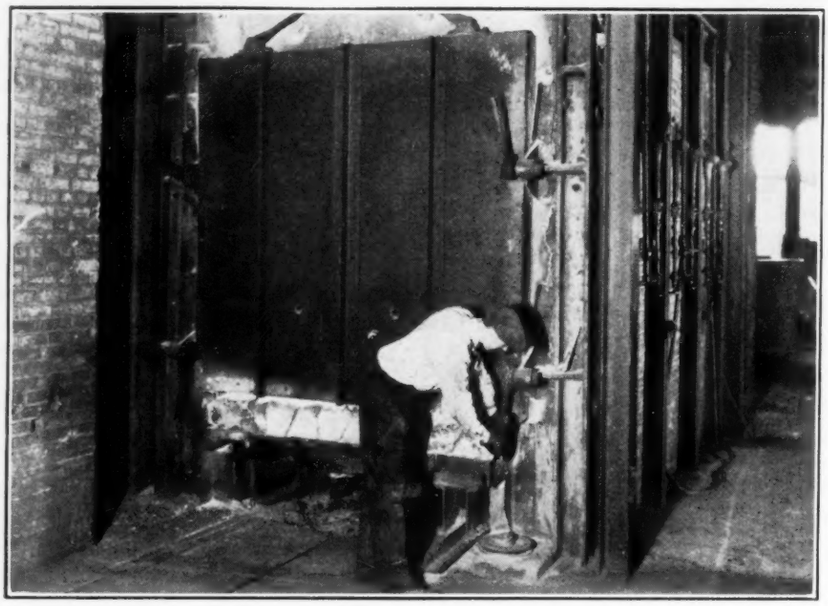
Welding a steel generator frame

One company is fabricating 1000 *tons of plates and shapes monthly by welding*



Nitriding serves to minimize the distortion of intricate parts which usually occurs in the process of carburizing steels



Subjecting steel to nitrogen at low temperatures is one of the outstanding achievements of heat treating for 1928

Nitriding Is Hailed as Important Advance In Heat Treating

PROGRESS in the development of aluminum-chromium steels and in the art of nitriding them has been most noticeable during the past year, according to the consensus of opinion of a number of authorities in heat treating and metallurgical fields. Due to the low temperature at which nitriding can be performed, the process has a decided advantage over carburizing in certain cases for producing surface hardness on parts which require a soft core. In this connection A. E. White, director of the department of engineering research, University of Michigan, Ann Arbor, Mich., says, in part:

"Steels which are carburized are heated to 1600 degrees Fahr. and higher, and subsequently usually are given one or two heat treatments to refine the grain of the case and core. Treatments at these high temperatures often cause warpage and scaling necessitating difficult and expensive straightening operations. The nitriding, being carried out at much lower temperatures, around 900 to 950 degrees Fahr., minimizes these difficulties.

"Of course a great many details in the process still exist, which should, and probably will, be investigated. No doubt, when the process has been given longer trial in practice, many more advantages will be brought to light. The development of these unusual aluminum-chromium steels, however, and the working out of the process for nitriding them stands out as a fine achievement in the field of heat treatment of steel."

"By all odds the outstanding development of 1928," is the phrase which Marcus A. Grossman, research engineer, Central Alloy Steel Corp., Canton-Massillon, O., applies to this "widespread increase in the use of nitrided steels." Mr. Grossman remarks that "the use of these steels and their application in industry have had a remarkable development during the past year and the process bids fair to replace a large tonnage of materials hardened in other ways."

W. H. Phillips, Molybdenum Corp. of America, Pittsburgh, considers the economic aspects of the nitriding situation. He says:

"A heat treating development which has forged ahead to the point where it gives great promise for the future is the nitriding art by means of which a structural steel, that is to say a steel that can be manufactured at prices in keeping with the present structural steel market and fabricated as are any of the high grade alloy steels after being subjected to an atmosphere containing nascent nitrogen at low temperatures for relatively short periods of time, becomes extremely hard. In fact this process has developed hardnesses heretofore unknown in the metallurgical industry, and along with this, remarkable corrosion resisting properties. While this development is yet in its infancy, it already has shown indications of having a profound effect upon metallurgical development in the next two or three years."

Mr. Phillips sees in nitrided steel a possible solution of one of the problems before the heat treating industry today. He continues:

"It is interesting to note that both the tungsten carbide tool, through its ability to machine hardened parts, and the nitrided article which has little or no distortion due to the low temperature at which it is made, tend to help in the problem of the successful heat treatment of intricate parts without distortion."

In the opinion of H. J. French, metallurgist, bureau of standards, Washington, progress in heat treatment "in general has been largely in the perfection of methods of treatment and the more widespread application of processes which, while comparatively new, were known before." He continues:

"Probably the outstanding development in the heat treating field has been the more widespread application of nitride hardening of the special steels. Much has been learned concerning the fields of best application and progress also has been made in reducing the long periods of nitriding necessary with the steels originally employed with this process. Advances also have been made in the control of the properties of the treated subjects.

"In the field of quantity production, steady progress has been made in the construction and application of furnaces for continuous heat treatment. Technical improvements in the manufacture and application of the silicon carbide resistor materials have in-

creased the use of electric heating, especially for high temperatures.

"In the field of technical knowledge, research has clarified and emphasized many of the factors responsible for lack of uniformity in heat treated products such as the effect of gases dissolved in or formed by the coolant, manner of coolant circulation and character of surface of the treated parts. Further progress has been made in the practical control of so-called abnormality in steels which often had a direct effect upon the selected processes of heat treatment. Progress also has been recorded in the application of salt bath heating for high speed tool steels, although time will be required to determine the extent of the advances made."

Development of furnaces, both electric and gas fired, is considered significant by H. M. Boylston, head of the department of mining and metallurgy, Case School of Applied Science, Cleveland, who comments as follows:

"Persistent and notable progress is evident in the adoption of electrically heated furnaces for commercial heat treatment. These are being produced in larger and larger units. This also has forced the manufacturers of gas heated furnaces to bend their energies toward increased efficiency and economy of gas-fired furnaces for heat treatment.

"In my opinion the control of temperature in heating furnaces nearly has reached its maximum development. It is quite possible that further developments will occur, but there is no comparison between the older methods of heat control and the present one."

Professor Boylson considers for a moment progress which has been made along the lines of theory and research. He states further:

"It begins to appear as if the reasons for the hardening of steel by quenching from above the thermal critical range now are capable of a comparatively simple explanation. Albert Sauveur and Zay Jeffries probably have done more toward the solution of this problem than anyone else and the early publication of Dr. Sauveur's opinion should remove many of the clouds of uncertainty which have surrounded this phenomenon for so many years. The use of high power photomicrography, so ably developed by F. F. Lucas and others, has added greatly to experimental knowledge of the causes of hardening."

Improvement of furnace and temperature control is the theme of the remarks made by A. V. deForest, research engineer, American Chain Co., Bridgeport, Conn., on the subject of heat treating developments in 1928. At the same time Mr. deForest raises certain questions on the uniformity of response to heat treatment in different types and grades of steel. His comments are as follows:

"The past year has seen a logical development of the tendency which has been apparent ever since the introduction of accurate pyrometers. The art of steel treating has so developed since the introduction of accurate temperature measurement that a great deal of attention has been brought to bear on uniform and accurate temperatures. Furnace temperature control has been greatly improved in the hope and expectation of securing uniformity in a finished heat treated product.

"It is fairly generally recognized that different heats of steel of the same specifications and analysis will turn out differently from a uniform heat treating process. The mechanical properties of one heat of steel may vary from those of another, by differences of the same kind as would be produced by a change of 100 degrees in the quenching temperature; but as yet little indication has been noted of a concerted study of the reason for this behavior.

"While many steel treaters realize this variation in response, few products allow conclusive experiments to indicate the variables present. The variation frequently is not one of hardness, but rather of a change in the hardness impact ratio, and the only non-destructive test, hardness measurement, can be used only to a limited extent. In this particular field magnetic methods of tests are well suited.

"If the magnetic characteristics can be distinguished sufficiently well by extensive mechanical tests to establish the significance of the magnetic variations, it becomes possible to measure the normal variations in various kinds of steel and various methods of heat treatment. A good example of this is in case the question comes up as to the desirability of normalizing before the regular heat treatment. Material from several different heats of steel in thousands of representative specimens can be heat treated both with and without normalization. The question whether the improvement in the average or the extreme variation is commercially worth while then can be settled quickly by mechanical or working tests on the particular samples which show the maximum departure from standard."

Bradley Stoughton, consulting engineer, Bethlehem, Pa., reiterates the sentiments of the others and concludes with the observation that "while the heat treatment of cast iron scarcely could be called the greatest unsolved problem in heat treating, nevertheless it is important and is unsolved.

Interesting work along the lines of furnace temperature control has been done by the General Electric Co., Schenectady, N. Y., whose research engineers have worked out a method of adapting a thyraton tube to the control of furnace temperatures. The temperature of the furnace is measured by a thermocouple connected to the grid circuit of the thyraton in such a way that, when the temperature is below the desired point, the thyraton carries current sufficient to operate a contactor requiring two or three amperes. In the past delicate mechanical devices have been used as relays to enable the heavy furnace currents to be controlled from minute currents from thermometers. The thyraton tube is said to be the most sensitive relay means yet found for amplifying these feeble impulses to control large amounts of power used for furnace heating.

Spurs Foundries To New Research Activity

(*Concluded from Page* 23)

been some significant though minor decrease in annealing time at several plants, based not so much on any new principle as on a better understanding of facts which have long been known and greater attention in the execution of melting and annealing operations to those variables which affect annealing rates.

Enrique Touceda, Albany, N. Y., consulting engineer for the Malleable Iron Research institute, says that many improvements have been made in malleable technique. He believes that the past year marks the beginning of a healthy and expanding growth of the industry along lines heretofore thought to be outside the field of malleable castings. For one thing, the limitation in size seems to have been raised. The muffle type oven has made practical and convenient the malleablizing of castings as large as 15 feet in length and weighing over 900 pounds.

In nonferrous foundry practice some interesting innovations give much promise of future development. The application of a special type of cupola using a high carbon fuel to melt yellow brass for castings is a case in point. This makes it possible to use yellow brass for much larger castings than previously. The brass casting industry, comprising as it does thousands of small establishments, suddenly finds itself confronted with the need for greater technical knowledge and more accurate scientific control. Commenting on this point, N. K. B. Patch, Lumen Bearing Co., Buffalo, says:

"It seems to me, however, that during the last few years there has been a gradual recognition of the desirability, not to say necessity, of skilled technical control of foundry operations. This, it seems to me, has culminated in the last year in an increasing appreciation of the products produced by foundries equipped with laboratories and a technical staff, and conversely, foundries without such equipment have definitely felt their handicap and many have added some form of technical control to their organization.

Improvement in Equipment Aid To Enameling, Galvanizing

PROBABLY the most vital and marked improvement in 1928 in the enameling industry has been the rather widespread adoption of the continuous porcelain enameling furnace according to R. C. Harmon, Ferro Enamel Supply Co., Cleveland.

The furnace represents a radical departure from recognized practice. It combines several processes in one and is automatic and continuous in operation. The temperatures and heat gradients as well as heating periods are automatically controlled. Waste, due to human equation, is reduced.

The ground and finish coats are burned on in this unit and the operation of drying is included, thereby doing away with the necessity of a separate oven.

The furnace proper is divided into five zones along its longitudinal axis. Each chamber is equipped with an automatic pyrometric control and ordinarily the temperature in one is set at the proper degree for the ground coat and that in the other for burning of the finish coat.

Heat is supplied by 16 gas burners located in the heating zone, half of them on either side. They are manifolded and supplied with inspirators which automatically proportion the gas and air mixture for perfect combustion and furnace atmosphere.

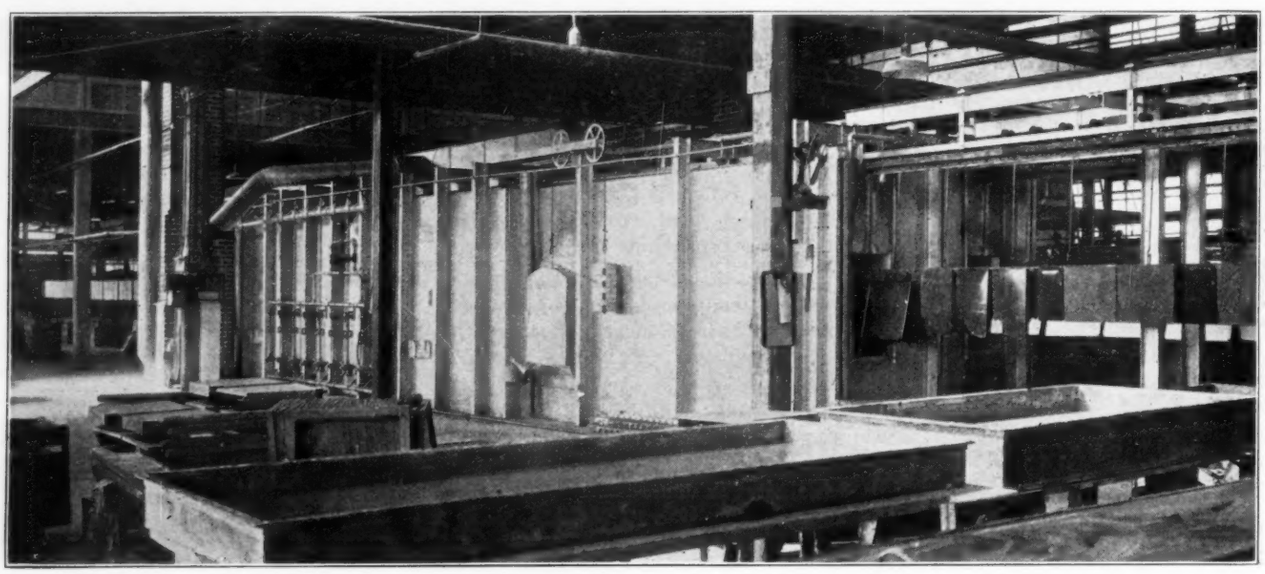
In commenting on the development in galvanizing practice for 1928, Wallace G. Imhoff, president, W. G. Imhoff Co., Pittsburgh, mentions the inauguration of the radiant combustion principle as an outstanding achievement and points out that this new gas or oil-fired galvanizing furnace is the greatest step in advancement made in the industry for perhaps the last 30 years. It might be compared to the placing of a galvanizing kettle between two large radiant fire stoves. The principle of this new type furnace is that the heat is applied uniformly over the entire side of top; that a large heat capacity for storage is provided; the heat control is automatic; the furnace is so designed, and the refractories of such character that heat flow is entirely under control; the kettle is heated by conduction and convection of the heat rather than by direct contact of the fuel with the side of the top as with the old coke-fired unit.

Details of Construction

The furnace is built on a reinforced concrete foundation. The body of the furnace is built of fire brick and the entire furnace is insulated. Bracing of the furnace is accomplished by what is known as the plate-girder system enclosing the entire furnace in heavy steel casing. Gas and air automatically are regulated and afford proper combustion and heat control. The controls may be set to supply all the heat necessary for heavy production and at the same time to automatically take care of the heat momentum after operations cease.

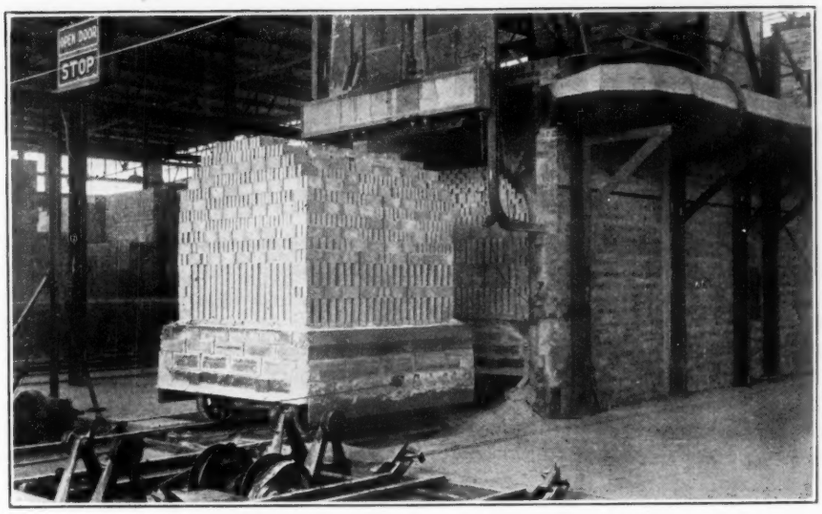
One of the most interesting developments in the sheet galvanizing industry, in the opinion of Macdonald S. Reed, sales engineer, Erie Foundry Co., Erie, Pa., has been the increased use of improved machines. The old machines were rather crude, mechanically and were not in keeping with recent developments in the machine tool field. Many details in the driving mechanism have been improved and chain gears provided for varying the revolutions per minute of the exit rolls as their diameter is reduced when they are turned down. Or the old type machine it was necessary to drive off gears from the shaft and to fit and key others in place. The new type machines, however, greatly reduce the time required for changing the exit rolls.

Mr. Reed has found that the case of the roller leveling machine is somewhat similar. The older machines were driven through gears keyed on the end of the roll. These gears were frequently of cast steel, with herringbone teeth and had to have a special tooth form because the center to center distance varied when the adjustment of the roll was changed. In the newer type machines, however, the gear drive is a separate unit, fully enclosed and operating in an oil bath. Each roll is driven through a spindle with two universal joints so as to allow movement of the roll when it is adjusted without any change in the gear tooth relation.



P ...in enameling furnace, automatic and continuous in operation, which combines various processes in one

Continuous gas-fired tunnel kilns for firing silica and clay brick gained prominence in the refractories industry in 1928



Carload of brick leaving discharge end of tunnel kiln which recently was completed by the Harbison - Walker Refractories Co.

Advent of Tunnel Kiln Significant In Refractories Industry

MODERNIZATION is the keynote in the program of progress made by the refractories industry during 1928. This is the consensus of opinion expressed by various operators and executives associated with this industry. According to C. E. Bales, production manager, Ironton Fire Brick Co., Ironton, O., outstanding development is the successful firing of silica refractories in a tunnel kiln. Many clay plants are firing their entire output including special shapes and 9-inch brick in tunnel kilns, which a few years ago would have been considered impracticable. Technical control of plant operations has been advocated more during the past year than at any time in the history of the industry, states Mr. Bales. He also points out that better selection of raw materials is being made, which means a more uniform product for the consumer. Various kinds of crushers, grinders, mixers and screens have been studied and greater efficiency has been obtained by their application.

Considerable attention has been given to the dry pressing of refractories. Not only is it possible to manufacture brick of the 9-inch series but many special shapes as well, according to Mr. Bales. Heavier, more elaborate and more flexible dry press machines no doubt will be a development of the near future.

Noteworthy advances in the ceramic field during 1928 had to do with both uniformity of shape and of quality, states G. A. Bole, research professor, ceramic engineering, engineering experiment station, Ohio State university, Columbus, O. To a greater extent than ever before raw materials for the manufacture of refractories are being selected with the view to uniformity. The trend toward dry press refractories is continuing, declares Mr. Bole. Methods for procuring better distribution of grain size and moisture content has been worked out in the case of dry press refractories. The trend toward tunnel kilns both in fire clay and silica fields is yielding results in a more uniform product.

Continues Investigation

Research at Mellon institute is continuing. The American Society of Mechanical Engineers co-operative research with the University of Illinois and the bureau of standards is producing valuable information concerning the mechanism of slag erosion in boiler furnces. Research in co-operation with the dry press manufacturers of Ohio is being initiated at the engineering experiment station, at Ohio State university, Columbus, O.

The trend from periodic kiln firing to firing in continuous tunnel kilns of greatly increased capacity, increasing tendency from hand manufactured toward machine manufactured clay refractories, adoption of more precise methods of works control in the manufacture of fire brick with a resulting increased uniformity of the product, increased manufacture of silica brick by machine methods, and the increasing use of alumina refractories especially for lime and cement kilns and in boiler settings are a few contributions of the refractories industry mentioned by Kenneth Seaver, general sales manager, Harbison-Walker Refractories Co., Pittsburgh.

Notable advances, as expressed by R. P. Heuer, director of research, General Refractories Co., Philadelphia, have been made through laboratory research in reducing the art of brickmaking to a scientific basis. The application of the principle of physical chemistry, the use of the petrographic microscope, the X-ray and similar devices have been of great assistance in this program. Mr. Heuer mentions that a new process of manufacturing chrome and magnesite brick has been devised and cites the installation of the largest brickmaking machine in the refractories industry at Baltimore.

"Casting of refractory objects from a molten mass as we have been casting iron now is a proven fact in commercial development," writes Ross C. Purdy, general secretary, the American Ceramic society, Columbus, O. In the formation of refractory wares, considerable attention has been paid to the effects of air in the mass as pressed or molded and the methods of pressing or molding to produce the texture best suited for withstanding the disintegrating agent found in use. Dr. Purdy is of the opinion that studying all the formations made by refractories and the designing of refractories for each specific case is the most important program now in the hands of the technical men of the refractory industry.

1928 Diary of American Business

New Ingot Peaks Enliven Markets—Export Efforts Pooled—Shape Awards Are Large

January	JAN. 1—B. F. Jones Jr., Pittsburgh, dies. 6—D. Z. Norton, Cleveland, dies. 12—C. A. Fisher resigns presidency of Jones & Laughlin Steel Corp.; T. M. Girdler succeeds him. 13—Gears & Forgings Inc. formed to acquire Van Dorn & Dutton Co. and Ohio Forge Co., Cleveland, William Ganschow Co., Chicago, Fawcus Machine Co., Pittsburgh. 17—Spang, Chalfant & Co. buys Standard Seamless Tube Co. and interest in Oil Well Supply Co. 20—Bars, plates and shapes advanced $1. 24—American Bridge Co. awarded 57,800 tons of structurals for Cleveland union terminal. 25—Reported negotiations for merger of Youngstown and Inland steel companies are completed.	*American Bridge Gets 57,800-ton Shape Award*
February	FEB. 1—Cold finished bars raised $2. 2—Holt-Gundy interests acquire control of British Empire Steel Corp.; President R. M. Wolvin resigns. 6—Wyckoff Drawn Steel Co. buys Fitzsimons Steel & Iron Co., Chicago. 9—Strip institutes and sheet association merge as National Association of Flat Rolled Steel Products, with headquarters at Cleveland. 13.—Hot strip advanced $2. 22—Plates, shapes and bars raised $1. 24—Crawfordsville Wire & Nail Co., Adrian Fence Co. and Dwiggins Wire Fence Co. merge as Mid-States Steel & Wire Co. 27—Ford Motor Co. inquiry for 400,000 tons of iron ore, 25 per cent over 1927, opens ore season. 28—Higher cast pipe duty asked.	*Sheet and Strip Institutes Form Merger*
March	MARCH 1—Develops that independents did not fully follow Corporation in $2 rise on bars, plates and shapes for second quarter, and contracts made at 1.85c, Pittsburgh. 6—Rivets advanced. 7—February steel ingot output proves record for that month. 8—Youngstown-Inland merger declared off. 9—Alloy steelmakers adopt differential method of quoting. 20—Gray Iron institute organized at Pittsburgh. 22—New Ford metalworking processes are described for first time. 27—Southwestern rate decision modified by interstate commerce commission. 29—IRON TRADE REVIEW analysis of 1927 steel earnings show average of 5.22 per cent, against 6.86 per cent in 1926.	*Youngstown-Inland Merger Plans Are Off*
April	APRIL 1—B. D. Quarrie made president of Oliver Iron & Steel Co. 2—A 5 per cent discount to jobbers on line and merchant pipe withdrawn. 5—Wrought Iron Research association, Pittsburgh, formed. 7—John Sommer dies. 13—T. J. Bray quits as president of Republic Iron & Steel Co.; Elmer T. McCleary succeeds him. 17—I. Lamont Hughes and E. P. Thomas made vice presidents of United States Steel Corp. 19—G. W. Niedringhaus dies. 23—John Oursler made vice president of Carnegie Steel Co. R. M. Keeney made vice president of Pittsburgh Crucible Steel Co. 26—Sharpsville Furnace Co. buys Neville Island blast furnace from the American Steel & Wire Co.	*Many Changes Made in Official Lineups*
May	MAY 1—Chapman Engineering Co. and Chapman-Stein Furnace Co. merge as Chapman-Stein Co. 3—Charles M. Schwab receives Bessemer medal from British Iron and Steel institute. 7—New high ingot record announced for April. Willis M. King made honorary vice president, American Iron and Steel institute. 10—Ferromanganese raised $5 for last half. 15—A. F. Morris elected president, Morgan Engineering Co. Steel Castings Development bureau opened at Philadelphia. 22—W. M. Neckerman made general manager of Republic Iron & Steel Co. 25—At American Iron and Steel institute meeting President Schwab proposes less cross-hauling of steel.	*British Honor Schwab, Who Would End Cross-Hauling*
June	JUNE 4—Structural Engineers' society organized at New York. 5—George C. Scott made president of United States Steel Products Co. 19—Bethlehem Steel Export Corp. and United States Steel Products Co. charter Steel Export Association of America. Bethlehem Steel Co. awarded 45,000 tons of shapes for Marshall Field building, Chicago. 20—Cold finished bars off $2. 23—Southern pig iron off 50 cents. 28—Graham distribution conference held at New York. 29—W. J. Olcott resigns as president, Oliver Iron Mining Co.; Pentecost Mitchell succeeds him. 30—All wire products reduced $2. James B. Clow & Sons, Chicago, buy control of National Cast Iron Pipe Co.	*Steel Export Association Is Organized*

Colored by Record Steel Output

Many Shifts Made in Personnel—Unity in Industry More Marked—Extras Revised

Bituminous Coal Strike Officially Ended

JULY 1—H. C. Frick Coke Co. cuts wages an average of 11 per cent. 5—First half year steel ingot output announced as a record. 10—Pig iron at Chicago drops to $17.50, the lowest since 1915. 19—United Mine Workers formally abandon bituminous coal strike declared April 1, 1927. 21—Institute of Scrap Iron and Steel, New York, organized. 22—A. J. Tuscany chosen secretary-manager of Gray Iron institute, Cleveland. 28—Crane Co. buys Landon Radiator Co. 30—Sheet producers begin reducing discount for cash in 10 days from 2 per cent to one-half of 1 per cent. 31—I. C. C. examiner recommends railroad extension giving Youngstown access to Ohio river.

July

Mileage Scale for Iron, Steel Rates Recommended

AUG. 1—Paul Mackall made vice president in charge of general sales of Bethlehem Steel Co. 4—Mileage scale for iron and steel freight rates in eastern territory and New England recommended by I. C. C. examiner. 12—J. B. Laughlin dies. 13—Wrought Iron Co. of America acquires Lebanon Iron Co. and Scranton Bolt & Nut Co. 16.—Republic Iron & Steel Co. buys Steel & Tubes Inc. 21—Cold strip raised $2. 24—W. A. Maxwell Jr. made vice president of Colorado Fuel & Iron Co. Southern iron up 75 cents and Chicago iron 50 cents. 25—James Bowron dies. 28—Henry Chalfant dies. Chemical specification extras on bar card revised. Alloy steel up $2 a ton.

August

Gulf States Steel Acquires New Officers

SEPT. 1—Record cargo of 14,178 gross tons of iron ore unloaded at Cleveland from HARRY COULBY. 4—American Railway association announces ban on wooden freight cars in interchange after 1930. 5—Jobbers meet at Pittsburgh to protest reduction in sheet cash discount. 6—J. W. Platten chosen chairman of Gulf States Steel Co., W. H. Coverdale president, and L. E. Geohegan vice president and general manager. 15—Mackintosh-Hemphill Co., Pittsburgh, reorganized. 18—Pig iron advances are general. 24—E. F. Scott chosen secretary of Ohio State Foundrymen's association. 25—Work is started on plant at Buffalo for Bliss & Laughlin. Survey shows steel stocks light.

September

Herbert Hoover Wins John Fritz Medal

OCT. 1—Hot strip makers generally adopt 6 inches as dividing line on prices, going on double base. 11—Development of new carbide-tungsten cutting material is announced at American Society for Steel Treating convention at Philadelphia. 11—F. Hughes Moyer made president of Mackintosh-Hemphill Co. W. B. Topping resigns as general sales manager of Republic Iron & Steel Co., effective Nov. 1, when he becomes western sales manager for Bethlehem Steel Co. 23—George T. Ladd made president of United Engineering & Foundry Co. Herbert Hoover awarded John Fritz medal by Engineering Foundation. 26—C. M. Schwab, at institute, urges single steel price standard.

October

Fluorspar Duty Is Increased by President

NOV. 1—A. M. Byers Co. announces mechanical puddling plant to be built at Ambridge, Pa. 2—A. E. Walker made general manager of sales of Republic Iron & Steel Co. 6—Form Krupp Nirosta Co. to pool alloy steel patents. 10—F. K. Copeland, president of Sullivan Machinery Co., Chicago, dies. Vanadium-Alloys Steel Co. to absorb Colonial Steel Co. 15—Barton Steel Co., Chicago, completing new rail steel bar mill. 13—William B. Pollock Co., Youngstown, reorganized. 16—C. N. Fitts chosen president of American Institute of Steel Construction. Rise of 50 per cent in fluorspar duty effective. 22—Col. T. S. Hammond elected president of National Founders.

November

Bethlehem Sues Corp. Over Shape Mill Patents

DEC. 1—American Steel & Wire Co. authorizes new rod mill at Cleveland. 3—E. A. Sperry made president of American Society of Mechanical Engineers. 5—W. J. Jack made manager of strip division of Republic Iron & Steel Co. 6—Bethlehem Steel Co. sues United States Steel Corp., alleging infringement of patents on Grey structural mill. 7—Wire products advanced $2 a ton. 18—I. C. C. refuses Pittsburgh, Lisbon & Western railroad permission to build to Ohio river. 19—H. J. Kelley made general manager, British Empire Steel Corp. 24 Merger of American Radiator Co. and Standard Sanitary Mfg. Co. nears. General Machinery Corp. is organized.

December

Mergers Increase Under Pressure of Severe Competition

Movement Embraces Manufacturing Enterprises, Railroads, Public Utilities and Banks—Iron and Steel Interests in Forefront

By John W. Hill

DURING 1928 the merger movement in American industry, which has been under way for more than four years, continued to gather momentum. The present movement has no parallel in the nation's economic history. It can only be compared with the remarkable period of combinations and consolidations which began in the latter part of the nineteenth century.

In the earlier period the merger movement assumed commanding importance only in the field of industrial companies. The scope of the present tendency toward combination is far broader. It embraces railroads, public utilities, and banks, as well as manufacturing enterprises.

During 1928 the iron and steel industry contributed its quota of mergers or consolidations. The most sensational development came early in the year when plans were announced for the bringing together of two important independents, the Youngstown Sheet & Tube Co. and the Inland Steel Co. The gigantic deal, involving vast properties and many millions of dollars, was never consummated, it being impossible for the principals to agree on essential points in the final negotiations. Later in the year the Republic Iron & Steel Co. about which there now centers much speculation, absorbed Steel & Tubes, and still later it was announced that the Ludlum Steel Co., and the Atlas Steel Corp., were planning to join forces.

Late in February of 1928 there was effected the formal merging of the Mansfield, Ashtabula, Empire, Falcon, Waddell and Thomas Sheet mills, into the Empire Steel Corp. The products of these six mills include all grades of steel sheets.

The automobile trade also provided some notable combinations, significant of the extraordinary conditions existing in that industry. Chief of these were the Chrysler-Dodge Brothers merger, that of Studebaker and Pierce Arrow, and that of the Hupp and Chandler companies.

The chief forces behind the present day merger movement are to be discovered in the following factors:

1. The prevalence of severe competitive conditions.

2. Narrow profit margins and the urgent need on the part of business for increasing efficiency.

3. The large capital costs frequently required to maintain operations on the most effective and efficient levels.

4. The state of over-expansion in some industries.

5. The facilities now available in this country for large scale financing, together with the impressive public investment demand that has existed for securities.

6. The changed attitude of the public and government toward big business.

Company combinations were stimulated in 1927 by dwindling profits. They continued during the past year, notwithstanding the marked improvement witnessed in the earnings of numerous industries. The increases in profits over the first nine months of the year ranged from 10 per cent to 20 per cent or more for various industries compared with the corresponding period of 1927.

Better earnings reports may be misleading in arriving at a true picture of the situation. Over against these cheering figures must be placed the records of commercial failures. Here are found unmistakable proofs that competition in business has lost nothing of its severity. During the first 11 months of 1928 the number of commercial defaults was 23,000 compared with 21,000 in those months one year before. Over the same period, the indebtedness involved in the insolvencies was $489,000,000 compared with $469,000,000 one year previously, a gain of 10 per cent.

Narrow Profits Here To Stay

Not long ago the National Industrial Conference board made a comprehensive analysis of profit ratios to sales and capital investment of more than 4000 large and successful industrial, mercantile, and other corporations, over a period of postwar years 1918-1925. The board arrived at a significant conclusion.

This was that narrow profit margins in competitive industry and trade have come to stay.

The board held that reduced margins constituted an inevitable characteristic of the trend toward large scale enterprise and mass production. The results of this study go to emphasize not only the hazard incurred today by all competitive business, but all the potential profitableness of efficient large-scale production.

The board made the interesting and significant discovery that corporations operating at the lowest ratio of profits on sales ordinarily had the highest turnover of capital. Consequently they often were among those enjoying the highest return on capital. It is also true that the producers whose profits are lowest or nonexistent are the least efficient, the high cost producers.

This is the economic state which confronts enterprise today. The result naturally is a tendency toward measures which may be calculated to improve efficiency and lower costs.

Assuming that the ability of management is satisfactory, industry is still faced with the necessity of keeping up with the tremendous competitive pace in productivity. This entails large outlays for constant improvements. Oftentimes smaller companies find it impossible to meet these expenditures, involving large sums for new machines and equipment. Mergers or consolidations with other companies is one way sometimes found to solve the situation.

Of course it is not only weak or small companies which resort to mergers to find solution for expansion problems. Occasionally one great company finds it is lacking in certain productive capacity, which would be provided by a merger with another company which has such capacity available. This was one of the considerations leading to the proposals for the combination of the Youngstown Sheet

& Tube Co., and the Inland Steel Co.

The question of overcapacity enters into many important mergers. It relates, frequently, to what is known as high cost or ineffective equipment, which is little used except in times of rising prices. Consequently it exerts a dragging effect upon the market generally, and sometimes is scrapped forthwith in the event of important consolidations.

One of the most modern tendencies in mergers, especially in the iron and steel industry, involves the bringing together of companies providing market outlets. This is exemplified in the broad plan apparently mapped out by the C. S. Eaton group of Cleveland. Eaton's plans have been the subject of growing interest in the iron and steel trade ever since he engineered the refinancing of the Trumbull Steel Co., in 1926. This interest has been heightened by subsequent developments and by the fact that Eaton in his present program, has such interests associated with him as the Mathers of Cleveland and the Mellons of Pittsburgh. Just what the boundaries of the general plan are, have not been divulged but the feeling prevails that the goal is the combination of large middlewestern independent mills into a new great unit.

The first step in this direction was taken late in 1927 with the combining of the Republic Iron & Steel and the Trumbull Steel Co. Eaton has previously acquired a strong interest in Republic. By this merger, Republic was given a good outlet for its supply of sheet bars, while Trumbull was provided with a supply of raw materials from which it produces sheets and other finished products. Similarly, the acquisition by the Republic Iron & Steel Co. of Steel & Tubes gave the larger company a large assured market for its strip steel. Eaton also is the controlling influence in the Central Alloy Steel Corp., and he and his associates are understood to have substantial holdings in Inland Steel. Just how soon or in what way, if at all, these properties are to be brought together remains a matter of speculation.

There seems to be less public hostility to large combinations by the railroads and such industries as iron and steel than to mergers in certain

(*Concluded on Page* 71)

Industrial Consolidations Are Numerous in 1928

THE following is a partial list of the more important consolidations in the metalworking industries, compiled from reports appearing in the columns of IRON TRADE REVIEW *during the past year:*

Black & Decker Mfg. Co.....Bought control of Van Dorn Electric Tool Co.
Danville Structural Steel Co. .....
Sold to Chas. M. Schwab, Bethlehem Steel Co.
Gears & Forgings, Inc. .....
Consolidation of Van Dorn & Dutton Co., Ohio Forge Co., Fawcus Machine Co., William Gaschow Co.
United Engineers & Construction Co. .....
Consolidation of United Gas Improvement Contracting Co., Public Service Production Co.
Chase Brass & Copper Co.....Bought assets of Ohio Brass & Copper Co.
Judson Mfg. Co. and Pacific Rolling Mill.....Merge to Judson-Pacific Co.
Central Iron Works, of San Francisco.....
Merged with McClintic-Marshall Co.
Underwood Typewriter Co. and Elliott Fisher Co. .....
Merged to Underwood, Elliott Fisher Co.
Fitzsimons Steel & Iron Co.....Sold to Wyckoff Drawn Steel Co.
Parker Wire Goods Co.....Bought Stephen Richard Co. Inc.
Torrington Co.....Purchased Tiley Pratt Co. (Essex, Conn.)
Wilmarth & Morman Co.....Consolidated with Covel-Hanchett Co.
Rogers Foundry & Mfg. Co. and Joplin Plant of United Iron Works
Merged to Rogers Iron Works Co.
Eaton Axle & Spring Co.....
Bought Automobile Heater Mfg. division of Perfection Heater Mfg. Co.
Crawfordsville Wire & Nail Co., Adrian Fence Co., and Wiggins Wire Fence Co.....Merged to Mid-States Steel & Wire Co.
Standard Steel Car Co.....Bought Illinois Car & Mfg. Co.
Republic Supply Co. .....
Buys entire capital stock of Associated Supply Co. from Youngstown Sheet & Tube Co.
Products Machine Co. .....
Bought from receiver assets of Bilton Machine Tool Co.
W. W. Zimmerman, Clifton Forge, Va.....Purchased Princess Iron Corp.
Joslyn Mfg. & Supply Co.....Bought Fort Wayne Rolling Mill Corp.
Bliss & Laughlin Inc. .....
Purchases plant and property of Hotchkiss, Blue & Co. Ltd.
Columbus McKinnon Chain Co. .....
Purchased chain block and electric hoist and crane divisions of Chisholm & Moore Co.
Lyon Metallic Mfg. Co., Durand Steel Locker Co. .....
Consolidated and named Lyon Metallic Products Co.
Republic Iron & Steel Co.....Absorbs Trumbull Steel Co. properties.
Root Co., Bristol, Conn., and Veeder Mfg. Co. .....
Consolidated and named Veeder-Root Co.
Borg-Warner Corp. .....
Consolidated from Borg & Beck Co., Warner Gear Co., Marvel Carburetor Co. and Indianapolis & Mechanics Machine Co.
Chapman Engineering Co. and Chapman-Stein Furnace Co. .....
Consolidated to form Chapman Stein Co.
Rockford Iron Works .....
Bought by I. Patrick, John W. Halstead, John L. Patrick of the E. W. Bliss Co.
Midwest Locomotive Works .....
Taken over by owners of Columbia Machine Tool Co. and Ceramic Machinery Co.
Rockford Malleable Iron Co. and Northwestern Malleable Iron Co.....
Consolidated as Rockford Northwestern Malleable Iron Co.
James B. Clow & Sons.....
Bought controlling interest in National Cast Iron Pipe Co.
Pennsylvania Bronze & Brass Co. Inc. .....
Formed as a consolidation of Aetna Foundry Co., Pennsylvania Bronze & Brass Co. Inc.
Oliver Machinery Co.....Bought business of Butterworth & Lowe.
Manning, Maxwell & Moore Inc. .....
Bought American Schaeffer & Budenberg Corp.
Eaton Axle & Spring Co. .....Bought Easy-on-Cap Co.
Crane Co.....Purchased plant and holdings of Landon Radiator Co.
Covel Hanchett Co. .....Purchased Badger Tool Co.
Meehan Steel Products Co. .....
Purchased plant of Ironton Punch & Shear Co.
Dravo-Doyle Co. (Austin mine gathering pump business) .....
Sold to Brown-Fayro Co.
Republic Iron & Steel Co.....Acquires control of Steel & Tubes Inc.
Bridgeport Chain Co. .....Bought by L. D. Round
Improvement Equipment Co. and Russell Engineering Co.....
Merged under control of Henry L. Doherty & Co.
Bingham & Taylor Corp. .....
Formed to take over steel foundry of W. P. Taylor Co.
International Combustion Engineering Co. .....
Bought the Hedges-Walsh Weidener Co.
Consolidated Industries Inc. .....
Consolidated from Free Sewing Machine Co., Rockford Book Case Co., Haddorf Piano Co., Landstrom Furniture Corp., Home Sewing Machine Co.
Latrobe Tool Co. .....
Acquired business of J. M. Carpenter Tap & Die Co.
Universal Wire Machinery Co. and Wire Machinery Corp. of America Merged.
Union Chain & Mfg. Co. .....
Acquired control of American High Speed Chain Co.
Nielsen Machine Co. .....
Come into control of C. C. Neilsen and Axel O. Neilsen.
Nordberg Mfg. Co.....Bought crusher business of Symons Bros. Co.
Simonds Worden White Co. .....
Formed by combination of L. & I. J. White Co., Worden Tool Co., A. A. Simonds Co. and R. J. Dowd Knife Works.
Jones Bros. Structural Steel Co.....Bought Industrial Metal Products Co.
Hope Engineering Co. .....
Sold its manufacturing business to C. & G. Cooper Co.
Wayne Pump Co. .....Bought Boyle-Dayton Co.
Precision Casting Co.....Bought control of P. & R. Tool Co. Inc.
Spencer Mfg. Co. .....
Taken over business conducted by J. A. Spencer Foundry & Machine Works.
Construction Machinery Co. .....
Has been merged with Equipment Corp. of America.
Industrial Brown Hoist Corp. .....
Has bought complete line hammers made and sold by Massillon Foundry & Machine Co.
Hydraulic Pressed Steel Co.....Purchased by Truscon Steel Co.
Pierce-Arrow Motor Car Co.....Control of acquired by Studebaker Corp.
E. I. du Pont de Nemours & Co. and the Grasselli Chemical Co.....
Consolidation.
Hupmobile Motor Car Co.....Acquires control of Chandler Motor Car Co.
Chrysler Motor Car Co.....Buys control of Dodge Bros.
Milwaukee Corrugating Co.....Has bought Eller Mfg. Co.
Republic Brass Corp. .....
Organized to acquire assets of Taunton-New Bedford Copper Co., Rome Brass & Copper Co., Dallas Brass & Copper Co., Michigan Copper & Brass Co., Higgins Brass & Mfg. Co., Baltimore Copper Mills division of General Cable Corp.
Atlas Steel Corp. .....Merges with Ludlum Steel.
Conrad Foundry Co.....Bought the Ware & Leonard Foundry Co.
McClintic-Marshall Construction Co. .....
Acquired the bridge works of Bethlehem Steel Co.
American Rolling Mill Co.....Purchased Norton Iron Works.
Vanadium-Alloys Steel Co.....Will absorb Colonial Steel Co.
Caterpillar Tractor Co.....Has acquired Russell-Grader Mfg. Co.
I. P. Morris Corp. and De La Vergne Machine Co. .....
Merged as I. P. Morris & De La Vergne Inc.
General American Tank Car Corp. .....
Has purchased plant and property of Buffalo Steel Car Co.
Continental Can Co.....Has bought business of R. Hardesty Mfg. Co.
Struthers-Wells Co., Titusville Iron Co. and Titusville Forge Co.
.....Merged to form Struthers-Wells-Titusville Corp.
American Radiator Co. and Standard Sanitary Mfg Co.....Plan merger

Fast records for iron ore mining were made in the fall of 1928, when the steel industry increased demands. This is the Mahoning mine, Mesabi range, operated by Pickands, Mather & Co., from which 2,830,000 tons of ore was shipped

Concentration, in Ore and Ownership, Is Trend at Iron Mines

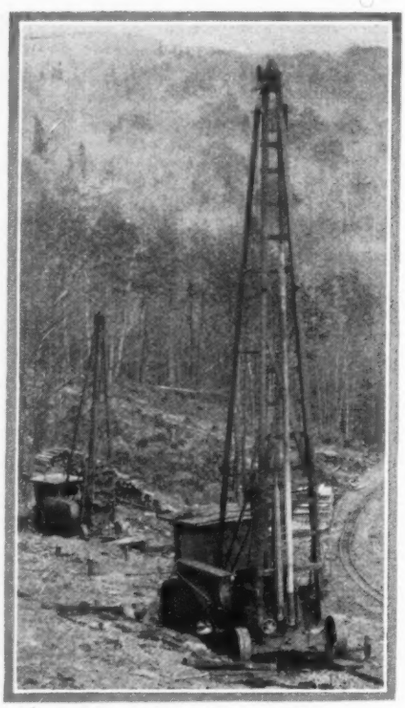
Large Operators Acquiring Important Properties To Protect Future Interests—Reserves Rapidly Diminishing—Beneficiation Making Great Strides

By A. J. Hain

A SUMMARY of the most important events in the Lake Superior iron ore industry during the past year emphasizes the growing appreciation by consumers of the real value of reserves. New developments of a novel and spectacular character are lacking, though the vast open pits, huge shovels, busy crushing and screening plants, and deep underground mines are as impressive as ever. The all-important feature of the picture today is of a business, rather than of a mechanical character. Certain interests are strengthening their position, looking to the future security of supplies, for themselves and their associated companies.

Important changes in this direction were noted two years ago; they became more noticeable in the past year, and further regrouping will appear in the near future. A new iron ore business map is being evolved, and in the pattern can be seen indications of what will develop later in the steel industry.

Iron ore reserves in the Lake Superior district have a more positive significance to mine operators and consumers than ever before. Ten or 15 years ago reference to total reserves was treated as an abstract proposition; there was more guesswork about the matter, and less worry. Individual operators had an approximate idea of what they possessed, but ore appeared so abundant, and prices so low that general estimates for the entire district were considered of no immediate importance.



Churn drilling for first blast at new mine on Marquette range. This area will soon resemble an open pit, as illustrated above

Today business policies in the iron ore departments of iron and steel companies are being based on a closer study of the relationship between individual reserves and the total. Careful, gradual selection and purchase of desirable properties by certain large companies, for future protection, obviously is a manifestation of this.

Reserves of iron ore of merchantable grade in the Lake Superior district are estimated by the tax and geological departments of the several states as 1,500,000,000 tons. If the ten-year average increment in shipments of ore over the past 30 years is applied in estimating future shipments, these reserves are sufficient for only 23 years. It is an extremely

narrow margin, considering the magnitude of the American iron and steel industry and the fact it depends on the Lake Superior district for 85 per cent of the ore it consumes. This situation raises the question of the accuracy of the estimates. The best indication is the degree of importance attached to them, and their influence on the actions of the mining companies which have capital in the iron and steel business.

About 1,250,000,000 tons of the reserves, five-sixths of the total mentioned, are in Minnesota. There the ore is near the surface and can be estimated satisfactorily. The state tax commission has access to records of the mining companies, and has other means for determining the size and character of ore bodies. The state assesses ore of a merchantable class, developed or undeveloped, and also that which can be made merchantable by present beneficiating processes. The state's taxation policy is one of strict enforcement of the law, though it is possible some deposits of good iron ore may be overlooked, or considered unimportant. The state does not include reserves of low-grade ore, concerning the extent and future value of which there is doubt.

In Michigan, having the bulk of the remaining tonnage, a different situation exists because of the depth of the ore. The state does not estimate for taxation the undeveloped reserves, except those immediately adjacent to developed ore bodies. Development proceeds as ore is shipped. The existence in Michigan of large bodies of high-grade ore as yet undeveloped is known; how much they will add to the reserves is uncertain. There is a noticeable increase in shipments from open pit mines in the state, due to the opening of siliceous iron ore properties. About 22 per cent of the ore from the Marquette range now comes from open pits.

An accompanying chart shows an almost unbroken downward trend of reserves in Minnesota during the past 14 years, while the chart for Michigan discloses a steady descent in the past seven years. The Michigan trend line reflects a slowing in the developments such as disclose new ore. The line for Minnesota indicates both slowing of development and tendency toward depletion.

Ore Shipments Increased 4.7 Per Cent

Totals by Ranges
Gross Tons

	1927	1928
Mesabi	32,524,781	34,991,687
Vermilion	1,463,001	1,571,362
Cuyuna	1,775,501	2,038,209
Total Minnesota	35,763,283	38,601,258
Gogebic	6,239,774	6,481,158
Marquette	3,904,595	4,053,114
Menominee	5,199,484	4,845,344
Total by lake	51,107,136	53,980,874
Total shipped all-rail	1,236,200	868,900
Grand Total	52,343,336	54,849,774

1928 Increase 4.7 per cent 2,596,438.

By Ports and Railroads
Gross Tons

	1927	1928
ESCANABA:		
C & N W	4,303,688	3,884,690
C M & St. P	1,561,536	1,602,866
MARQUETTE:		
D S S & A	826,304	758,736
L S & I	2,412,551	2,652,166
ASHLAND:		
C & N W	4,497,425	4,574,275
SOO LINE	1,091,075	1,135,600
SUPERIOR:		
GREAT NOR.	12,945,606	13,469,476
SOO LINE	1,091,075	1,135,600
NOR. PAC.	591,255	808,618
DULUTH:		
D M & N	15,432,188	17,454,063
TWO HARBORS:		
D & I R	5,703,159	5,733,501
TOTAL	51,107,136	53,980,874
1928 Increase 5.62%		2,873,738

Standard Grades Being Depleted

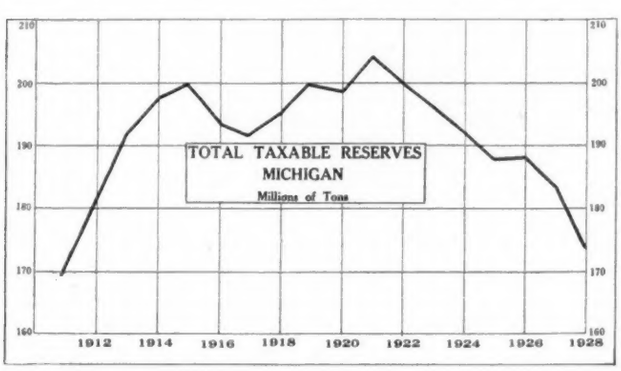
Official estimates of reserves are considered sufficiently accurate to base a conclusion that the steel industry has comparatively small leeway in supplies of present standard grades of ore. And they afford sufficient reason for expecting two lines of action: Further merging of property interests with a view to protection, conservation and control of costs; and development of methods for treating low grades of ore.

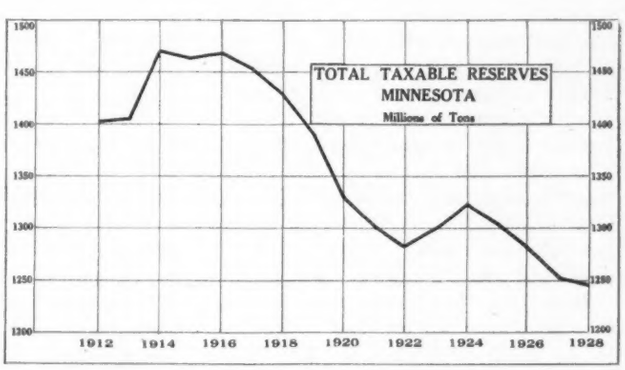
Years ago periodical visits to the Lake Superior iron ore district disclosed vast physical changes. Opening of many new mines, year after year, the introduction of larger and more efficient equipment, construction of washing and screening plants, the modernizing of docks and handling facilities, and more recently the electrification of mine equipment and development of labor-saving underground mining apparatus—these were the most impressive features of the industry.

Today operations appear to be in a more settled state. Few new mines are being opened; more are being abandoned. Little change is noted in equipment or methods. Plant capacity for beneficiating ore has not been greatly expanded. Mining at some of the largest properties has become such a matter of routine that a few observers profess to believe "developments in the Lake Superior district have passed the peak," an opinion completely at variance with what the future surely will disclose.

One-third of all the ore shipped from the Lake Superior district in the past few years has passed through some simple process of "beneficiation" such as washing, drying, crushing, screening and the like, but real developments in the treating of low-grade ore have hardly started. Greater forward strides have been made in the past five years than in all the previous history of the industry, and the next five will see much more important progress. This is apparent to those who know how energetically some of the operators are pushing experimental work. Some results of far-reaching importance have been obtained, though not yet of general application.

One of the most important developments is the recognition of the value of the removal of silica from the ore, and since this fact has been recognized, methods to eliminate silica have been much more enthusiastically received. Some engineers

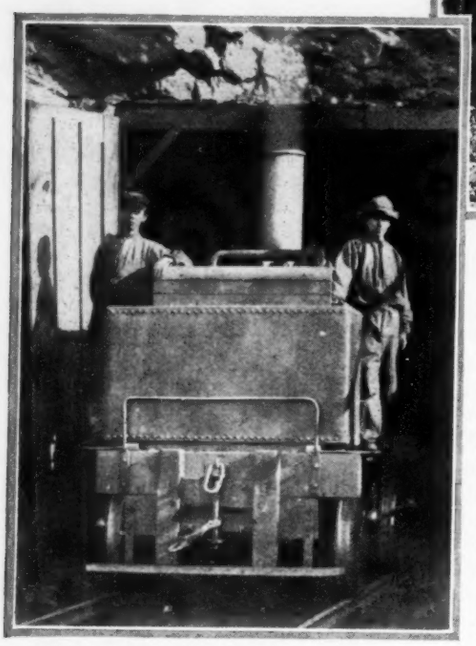




These charts indicate how iron ore reserves are being depleted. All merchantable grades in Minnesota are assessed. In Michigan, where the deposits are deep, assessments are made as ore bodies are disclosed by development

see a possibility of adopting a modification of the flotation process for the treatment of certain grades of iron ore. Research work is constantly carried on at state mine departments.

The magnetic separation, and sintering plant at Babbitt, Minn., Mesabi range, showed how many millions of tons of low-grade magnetite can be treated successfully, though not now competitive with low-price standard grades. Plant and equipment have been lying idle several years, waiting for a turn in the economic tide.



THESE two illustrations span 50 years of mining in the Lake Superior district "Johnny Bull" was the first steam locomotive used for underground and open pit work at Jackson mine, Negaunee, Mich., 1879. The locomotive was built in England. Having finished mining at Ogden pit, the 100-ton electric shovel is crunching through the woods to begin stripping at the new Tilden mine, Negaunee, a few miles from where "Johnny Bull" started work.

Meanwhile, a sintering plant on the Cuyuna range, not involving anywhere near the number or complexity of mechanical operations as required at Babbitt, has been increasing its shipments. There will not be an abrupt ascent from low-priced ore to a high-price "manufactured" product. Present reserves will act as a buffer against that; those who are pioneering in new methods realize they must keep down costs.

Prices paid by ore consumers are approximately 40 per cent below the levels of ten years ago. They have remained unchanged for four consecutive years while taxes and costs of production have steadily increased, despite the use of labor-saving equipment. Operators say prices have not yielded a fair return, especially when it is considered how reserves are constantly decreasing. Dwindling supply and increasing demand can have only one ultimate result, come when it may, and that is higher prices.

Note that five years ago the five leading operators in the Lake Superior district, including the Steel corporation's subsidiary, shipped 72.4 per cent of the ore to consumers, while in 1928 the same five shipped 81.5 per cent, during which same period the corporation's share has tended to diminish. Note also that seven companies which were actively selling ore five years ago are not in the picture today. Only eight companies now are selling ore in the merchant market, and of these only four or five are real factors. Further, the bulk of the tonnage mined by the three largest of the latter group goes to associated furnace interests.

* * *

A BRIEF review of what some of the leading companies are doing at their properties shows the Oliver Iron Mining Co., subsidiary of the Steel corporation, stripping the heavy overburden from the North Forty, which is part of the Hull-Rust mine, and formerly the site of the old village of Hibbing, Minn. Stripping has been in progress there several years. The Mesabi Mountain mine is being similarly developed. Shipments from this state-owned property broke all its former records in 1928, with 6,052,734 tons, and again exceeded the tonnage forwarded from the Hull-Rust. "Magnificent," said President Coolidge as he looked down on these great mines, while on a visit to the ranges during his vacation last summer.

The Oliver company started to ship from its new Godfrey underground mine near Chisholm, Minn. It abandoned operations at the Wanless mine, the Chisholm open pit and the Higgins-McEwen mine on the Mesabi range, and the Tilden mine on the Gogebic range. The company is planning extensive development work at underground mines on the Gogebic range. At some of these mines shafts will be abandoned and ore will be hauled with electric locomotives fully two miles, underground.

The year brought a realignment of the official personnel of the company, with the retirement of W. J. Olcott, president, and John H. McLean, general manager. Pentecost Mitchell, vice president, became president, while Le Roy Salsich, assistant to the president, was made vice president and general manager. A. Y. Peterson, general superintendent of the Canisteo district, became assistant to the president, while W. M. Tappan was made general superintendent of the combined Hibbing-Chisholm district. Fred R. Mott, general superintendent of the Virginia district, was appointed general superintendent of the combined Virginia and Everett districts. Charles Grabowski, general superintendent of the Everett district, succeeded Mr. Peterson in the Canisteo district.

Pickands, Mather & Co. took over the Sagamore mine, Cuyuna range, from John A. Savage & Co., under a long-term contract. The Sagamore is reputed to be the world's largest open pit manganiferous iron ore mine. Operations were increased and more than 300,000 tons shipped from it in 1928. Pickands, Mather & Co. also acquired from Clement K. Quinn & Co. the Mahnomen-Sultana-Hopkins mine interests on the Cuyuna range,

and began stripping 1,750,000 cubic yards of overburden at the Mahnomen, preparatory to making larger shipments from the mine. It is an important manganiferous ore property. While Pickands, Mather heretofore did not operate mines on the Cuyuna range, the arrangements completed in the past year, such as noted and others, now give it the dominating position. It will have capacity for shipping about 800,000 tons of high-grade manganiferous iron ore annually from the mines named. This development reflects the demand from certain steelmakers for manganiferous ore. The main source of supply in the Lake Superior district is now under one control.

Pickands, Mather & Co. probably will begin shipping in 1929 from the Orwell mine, adjoining its Danube, on the Mesabi range. This is a large new open pit in which the Youngstown Sheet & Tube Co. and Inland Steel Co. are interested. Stripping began in 1927; 2,000,000 cubic yards of overburden have been removed, and 2,680,000 still are to come off. The company also has plans for stripping operations at the Mahoning mine, Mesabi range, and the Plymouth, Gogebic range. It has remodeled its concentrating plant at the Danube mine. It sank a new central shaft at its Penn and Vulcan mines on the Menominee range in Michigan, equipping it electrically, and carried forward extensive open pit development work on the Marquette range.

The M. A. Hanna Co. started stripping at the Mesabi Chief mine at Keewatin, Minn., and will be shipping from it in 1929. Equipment will be completely electrified. A screening and washing plant—making the thirty-ninth to be built in the state of Minnesota—is now under construction at the mine. This company is sinking a shaft about 315 feet as an outlet for ore from the Susquehanna open pit. Owing to the depth of the pit and the consequent long haul to remove the ore in the usual way, a more direct and practically level route will be taken through underground drifts to the base of the shaft. Four standard gaged motorized cars of 4 cubic yards capacity each will be used to haul strings of six regular dump cars through the drifts to 8-ton skip hoists. The mine is a large producer and as much as 600,000 tons of ore will be handled in this way in a working period of seven months. Lease on the Carpenter underground mine at Crystal Falls, Mich., Menominee range, will be canceled by the Hanna company this year.

The Cleveland-Cliffs Iron Co. operated nine mines on the Marquette range in 1928. It closed the Republic mine which was in operation since 1871 and which produced nearly 8,000,000 tons of ore. The deposit of merchantable ore has been mined out.

The Cleveland-Cliffs company will increase production of siliceous ore by opening up the Tilden mine at Negaunee, Mich. Preparations are now being made to enable it to mine from 300,000 to 500,000 tons annually from this deposit. The company is the largest owner of hydroelectric power development in the Lake Superior district, and as it has to continue to supply users outside of its own requirements it has added still another unit by development on the Escanaba river. The company will begin next summer to erect a washer to concentrate the ore produced from a large pit, including the Holman, Brown, Bingham, and North Star properties on the Mesabi range. This is a joint operation of the Holman-Cliffs and Mesaba-Cliffs Iron Mining Co. It is expected this pit will be operated at the rate of about 650,000 tons of ore per year.

An interesting event on the Marquette range occurred last September when 50 men connected with the Cleveland-Cliffs Iron Co. paid a tribute to their president, William C. Mather, at a dinner in Ishpeming. Mr. Mather recently completed 50 years of service with the organization, the greater part of the time as active head of the company, and it has been due to his foresight that the company has grown into one of the largest of the independent firms producing iron ore.

A modern shaft is being sunk by Oglebay, Norton & Co. on property acquired under lease by them for the Brule Mining Co. known as the Brule mine located in the Iron River district of the Menominee range. Drilling is also being done by them on Lenox property in the Stambaugh district of the same range.

Iron ore mine operations by Clement K. Quinn & Co. in 1928 were confined practically to the Marquette range. The company has four mines on the range, the Empire, Rolling Mill, Archibald and Kruse, three of which were operated during the season. From these 471,191 tons of ore was shipped in 1928, compared to 354,347 tons shipped from the four mines in 1927. The total shipments of the company from the Marquette and Mesabi ranges for the season were 521,741 tons, as compared to 869,443 tons in 1927. The difference, of course, is due to the fact that the company had no shipments this year from the manganiferous property on the Cuyuna range that it formerly operated.

The Ford Motor Co. did not ship from its new Bluberry mine at Ishpeming, Mich., in 1928, but expects to get in production for 1929.

Minnesota Ore Reserves and Assessed Values

Ore in Ground

County	May 1, 1927 Tons	May 1, 1927 Assessed value	May 1, 1928 Tons	May 1, 1928 Assessed value
St. Louis	1,066,304,867	$227,847,971	1,048,805,191	$221,958,543
Itasca	137,631,156	15,904,766	146,609,471	17,750,599
Crow Wing	49,203,892	3,315,283	52,723,628	2,978,045
Totals	1,253,139,915	$247,068,020	1,248,138,290	$242,687,187
Ore in Stockpiles				
St. Louis	9,036,625	$ 6,269,616	9,208,050	$ 6,608,522
Itasca	207,961	234,425	341,474	379,363
Crow Wing	448,700	392,600	544,810	516,751
Totals	9,693,286	$ 6,896,641	10,094,334	$ 7,504,636
Total Merchantable Ore in Ground and Stockpiles				
St. Louis	1,075,341,492	$234,117,587	1,058,013,241	$228,567,065
Itasca	137,839,117	16,139,191	146,950,945	18,129,962
Crow Wing	49,652,592	3,707,883	53,268,438	3,494,796
Totals	1,262,833,201	$253,964,661	1,258,232,624	$250,191,823

Assessments as given in above table do not include those for surface values, structures or improvements.

Michigan Ore Reserves and Assessed Values

County	1927 Tonnage	1927 Total value	1928 Tonnage	1928 Total value
Dickinson	6,441,326	$4,488,000	5,250,962	$3,720,000
Gogebic	53,342,720	40,292,000	48,681,075	38,184,000
Iron	60,662,166	22,279,000	59,501,715	21,688,000
Marquette	63,612,812	31,972,000	60,219,781	30,005,000
Totals	184,059,024	$99,031,000	173,653,533	$93,597,000

Steel Demand by Main Groups, 1923-1928

	1928		1927		1926		1925		1924		1923	
	Tonnage	Per cent of Total	Tonnage	Per cent of Total	Tonnage	Per cent of Total	Tonnage	Per cent of Total	Tonnage	Per cent of Total	Tonnage	Per cent of Total
Railroads	5,253,925	18.36	6,068,673	20.32	8,162,078	22.81	7,391,740	22.34	7,509,952	27.54	9,949,886	31.02
Building*	4,664,754	15.89	4,439,553	14.86	4,688,169	13.10	5,070,015	15.32	3,937,890	14.44	4,339,795	13.53
Oil, gas and water	2,462,494	8.68	2,643,225	8.85	3,322,826	9.29	2,667,820	8.07	2,302,863	8.43	3,400,531	10.60
Automotive	4,590,931	15.79	3,971,690	13.30	5,397,870	15.09	4,822,426	14.57	3,099,332	11.37	3,397,010	10.59
Exports	2,555,513	5.71	1,602,223	5.36	1,892,243	5.29	1,488,176	4.49	1,606,289	5.89	1,995,350	6.22
All others	10,849,599	35.57	11,145,136	37.31	12,317,746	34.42	11,653,558	35.21	8,815,866	32.33	8,995,203	28.04
Grand total	30,377,216	100.00	29,871,100	100.00	35,780,932	100.00	33,093,735	100.00	27,272,192	100.00	32,077,775	100.00

All years computed as 100 per cent of total capacity, based on returns from 96.04 per cent of steel ingot capacity for 1928; 94.89 per cent for 1927; 89.89 per cent for 1926; 80.99 per cent for 1925; 78.89 per cent for 1924; 72.10 per cent for 1923.

*Exclusive of railroad bridges and buildings.

Broader Distribution Marks Largest Steel Year

MARKED by diversions into new channels, the eighth annual finished steel distribution survey of IRON TRADE REVIEW points to a broadening application of that basic material. Based on returns of companies controlling 96.04 per cent of country's total ingot making capacity, preliminary totals of finished steel distribution in 1928 aggregated 30,377,216 tons. This shows a slight increase over the 29,871,100 tons reported for 1927.

Nearly 100 companies having a total steel ingot capacity of 56,459,875 tons contributed to the present steel consumption analysis.

The leading consuming classifications, railroads, buildings, automotive and oil, gas and water required a total of 58.72 per cent of the nation's steel tonnage in 1928, as compared with 57.33 per cent in 1927, 60.29 per cent in 1926, 60.30 per cent in 1925, 61.78 per cent in 1924, and 65.74 per cent in 1923. Although the concentration of steel consumption in these leading groups was slightly more pronounced in 1928 than in 1927, this was due largely to the unusually heavy demands from the automotive group, reflected by the greatest automobile production in history. This classification took 15.79 per cent of total tonnage in 1928, or 4,590,931 tons, compared with 13.30 per cent and 3,971,690 tons in 1927.

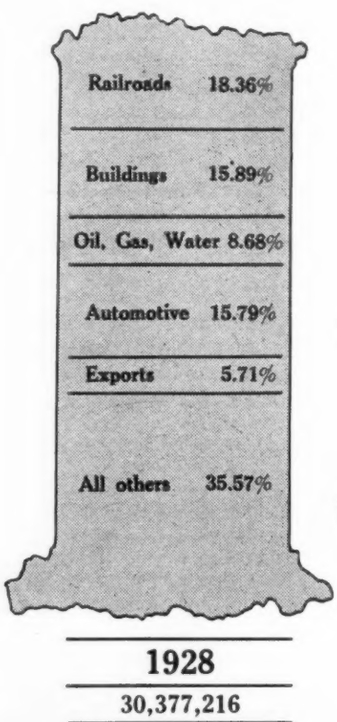
The building group was the only other major consuming classification to register an increase in 1928, showing a total consumption of 15.89 per cent of the total. That this is the heaviest proportion ever required by the building group reflects in no small measure the effect which broader ap-

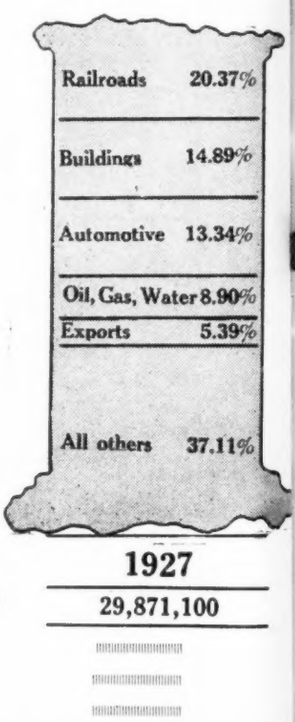
Steelmakers Co-operate in Census

ASSISTED by the most gratifying co-operation of American steel producers, IRON TRADE REVIEW *presents in the accompanying pages its eighth annual analysis of finished steel consumption. Inaugurated in* 1921 *and developed in subsequent years, the analysis in this issue is based on reports received from almost a hundred manufacturers and fabricators controlling* 96.04 *per cent of the steel ingot capacity of the country.*

The classification of consuming groups has been altered slightly to permit additional refinements, but with the thought in mind that the opportunity for comparisons with the figures of the previous seven years will not be destroyed. The changes occur principally in the railroad and building groups, each having been broken up into three sub-classifications. The position of consumption by jobbers has been changed to show more clearly the tonnage handled by these distributors. The steel products listed in this year's tabulation remain unchanged from the 1927 *reports.*

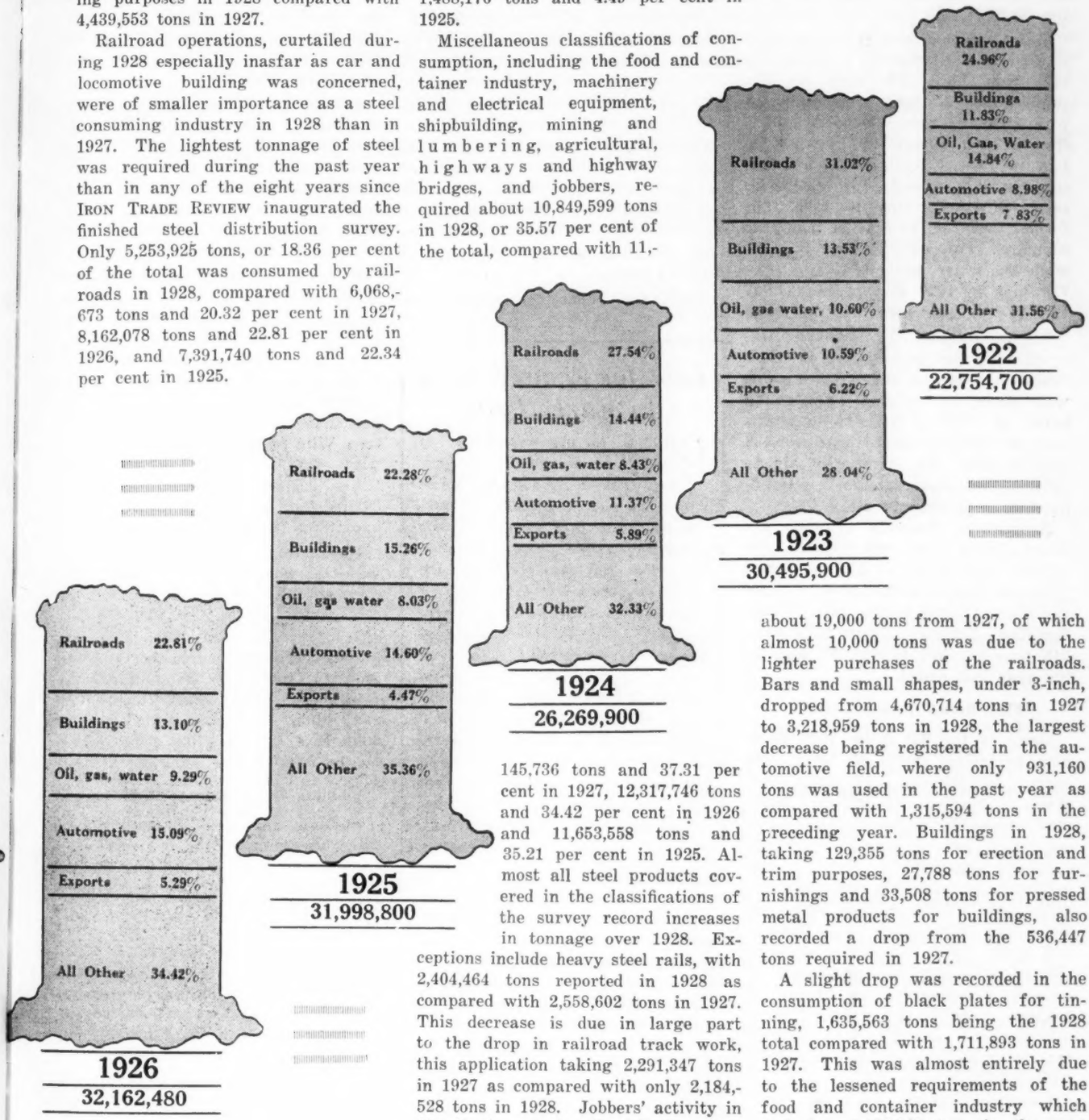
While every effort has been made to insure accuracy in the analysis, the figures should be considered preliminary and subject to revision in a later issue of IRON TRADE REVIEW.





plication of steel to buildings and residences is having. A total of 4,664,754 tons was required for building purposes in 1928 compared with 4,439,553 tons in 1927.

Railroad operations, curtailed during 1928 especially inasfar as car and locomotive building was concerned, were of smaller importance as a steel consuming industry in 1928 than in 1927. The lightest tonnage of steel was required during the past year than in any of the eight years since IRON TRADE REVIEW inaugurated the finished steel distribution survey. Only 5,253,925 tons, or 18.36 per cent of the total was consumed by railroads in 1928, compared with 6,068,673 tons and 20.32 per cent in 1927, 8,162,078 tons and 22.81 per cent in 1926, and 7,391,740 tons and 22.34 per cent in 1925.



Oil, gas and water requirements fell off slightly in 1928 from 1927, due to unfavorable conditions in the oil industry. This group consumed 2,462,494 tons, or 8.68 per cent of the total tonnage, as compared with 2,643,225 tons and 8.85 per cent in 1927, 3,322,826 tons and 9.29 per cent in 1926 and 2,667,820 tons and 8.07 per cent in 1925.

Iron and steel exports, the heaviest for 1928 in history, approximated 2,555,513 tons, or 5.71 per cent of the total, compared with 1,602,223 tons and 5.36 per cent in 1927, 1,892,243 tons and 5.29 per cent in 1926 and 1,488,176 tons and 4.49 per cent in 1925.

Miscellaneous classifications of consumption, including the food and container industry, machinery and electrical equipment, shipbuilding, mining and lumbering, agricultural, highways and highway bridges, and jobbers, required about 10,849,599 tons in 1928, or 35.57 per cent of the total, compared with 11,145,736 tons and 37.31 per cent in 1927, 12,317,746 tons and 34.42 per cent in 1926 and 11,653,558 tons and 35.21 per cent in 1925. Almost all steel products covered in the classifications of the survey record increases in tonnage over 1928. Exceptions include heavy steel rails, with 2,404,464 tons reported in 1928 as compared with 2,558,602 tons in 1927. This decrease is due in large part to the drop in railroad track work, this application taking 2,291,347 tons in 1927 as compared with only 2,184,528 tons in 1928. Jobbers' activity in distributing steel rails fell from 21,247 tons in 1927 to 1419 tons in 1928.

Another decrease was registered by light rails, dropping from 133,229 tons in 1927 to 106,279 tons in 1928. The leading reason for this decline was the slack demand from the mining and lumbering fields, no small part of which was played by the depressed economic condition in the soft coal industry. Mining and lumbering uses in 1928 took but 79,684 tons of light rails, as compared with the considerably higher 106,992 tons in 1927.

Angle bars, steel ties and other track accessories recorded a drop of about 19,000 tons from 1927, of which almost 10,000 tons was due to the lighter purchases of the railroads. Bars and small shapes, under 3-inch, dropped from 4,670,714 tons in 1927 to 3,218,959 tons in 1928, the largest decrease being registered in the automotive field, where only 931,160 tons was used in the past year as compared with 1,315,594 tons in the preceding year. Buildings in 1928, taking 129,355 tons for erection and trim purposes, 27,788 tons for furnishings and 33,508 tons for pressed metal products for buildings, also recorded a drop from the 536,447 tons required in 1927.

A slight drop was recorded in the consumption of black plates for tinning, 1,635,563 tons being the 1928 total compared with 1,711,893 tons in 1927. This was almost entirely due to the lessened requirements of the food and container industry which took but 1,102,049 tons in the past year compared with 1,205,463 tons in 1927.

Tubing and pipe requirements were slightly lower in 1928 than in 1927, requiring 3,124,043 tons compared with 3,124,043 tons in 1927. The decline reflected conditions in the oil industry. Although a number of heavy pipe lines were placed in 1928, the tonnage of steel pipe that was required dropped. Curtailed drilling operations was an important factor in this situation. Steel pipe and tub-

in 1928 and 0.97 per cent in 1927. ing required for the oil, gas and water industries in 1928 was 1,462,189 tons, compared with 1,599,994 tons in 1927.

Wire products was the only other classification to register a decline in 1928 from 1927. The total for this product was 2,115,951 tons compared with 2,257,167 tons. Exports gained from 117,597 tons in 1927 to 130,940 tons in 1928. Agricultural and automotive requirements for steel wire increased considerably in 1928. The former took 538,776 tons in that year compared with 450,700 tons in 1927 while the latter demands totaled 191,753 tons in 1928 as against 131,643 tons in the year previous.

Slight increase in demand was noted in plates and shapes in 1928. One of the largest comparative gains was made by concrete reinforcing bars. A total of 671,648 tons was used in 1928, compared with 462,482 tons in 1927. An increase of almost 100,000 tons was registered in road-building requirements alone.

Automotive demands in 1928 for hoops, bands and cotton ties were 142,344 tons heavier than in 1927. This and larger agricultural requirements contributed to the gain in consumption of those products from 648,313 tons in 1927 to 919,737 tons in the year just ended.

Flat Rolled Products Gain

Gains in the flat rolled steel products, galvanized sheets, all black plate except for tinning, and strip steel, were of marked proportions. Strip steel made the greatest gain, jumping from 940,137 tons in 1927 to 1,590,680 tons in 1928. In fact, automotive requirements in the year just ended were 960,500 tons, or more than the entire strip consumption reported last year. The broadening application of strip steel to a multitude of uses is indicated by the growth of tonnage reported under the all other miscellaneous classification, 330,363 tons being so listed in 1928, compared with 203,520 tons in 1927.

Galvanized sheets increased from 909,292 tons in 1927 to 1,274,475 tons in 1928. The greatest gains were recorded in building demands, highway work, agricultural and miscellaneous requirements.

All other black plate and sheets, excepting black plate for tinning and galvanized sheets gained from 2,928,068 to 3,580,140 tons in the 1927-28 period. The increase was centered in a gain of about 475,000 tons in the automotive field.

To refine further the data collected on steel distribution, IRON TRADE REVIEW this year has tabulated some of the intermediary processes. A total of 12 companies, reporting bolt, nut and rivet production, indicated a total consumption of 294,204 tons of steel. Of this amount, 140 tons was plates, 3 tons shapes, 238,817 tons bars, 693 tons hoops and bands, 417 tons tubing and pipe, 54,071 tons wire products, and 63 tons of all other products.

Seven manufacturers, reporting forgings output, indicated a total consumption of 125,556 tons of steel, 1050 tons being plates, 3 tons shapes, 123,278 tons bars, 617 tons tubing and pipe, 604 tons wire products, and 4 tons all other.

Tank and boiler consumption, reported by nine companies, required 344,450 tons of steel. Of this total, 313,665 tons was plates, 173 tons bars, 28,317 tons all other black plate, 352 tons galvanized sheets, and 1943 tons tubing and pipe.

Largest of these intermediary processes was stampings. This industry required a total of 600,813 tons of steel. The total was largely made up of sheets and plates. The requirements by products were: Plates, 171,140 tons; bars, 3202 tons; all other black plate, 252,709 tons; galvanized sheets, 6590 tons; wire products, 881 tons; strip, 161,341 tons, and all other products, 4950 tons.

Diminished importance of shipbuilding as a steel consumer was reflected in 1928 when but 0.53 per cent of the total was used, as compared with 0.83 per cent in 1927. Mining and lumbering also declined, taking 0.81 per cent

Look for Revised Data In Early Issue

OWING to the prevalence of influenza in certain sections of the United States, the office forces of many of the steel companies reporting were seriously handicapped and delayed in making their final compilations. Inability on the part of the staff of IRON TRADE REVIEW *to properly interpret and distribute some of the reports received at the last minute is responsible for slight omissions, which when added will bring the total tonnage of rolled steel reported up to approximately* 32,000,000 *tons. Complete revised figures, which however will not alter the percentage of steel consumed by each industry appreciably, will appear in an early issue.*

Machinery and electrical equipment, however, registered a gain, taking 1,003,090 tons, or 3.51 per cent, compared with 787,060 tons and 2.78 per cent in 1927. Plate and bar consumption for this industry decreased, but sheet and pipe increases more than offset that decline.

Jobbers handled a smaller tonnage of steel in 1928 than in 1927, the year just ended having 3,091,715 tons pass through that channel of distribution, compared with 3,602,640 tons in the year previous. Jobbers handled 10.83 per cent of the total in 1928, as against 12.71 per cent in 1927.

Pipe and tubing, wire products and sheets continued to be the mainstays of the jobbing business, almost two-thirds of the tonnage handled by warehouses being in those classifications. Pipe and tubing led, as usual, with 959,597 tons passing through jobbers' hands, out of a total of 3,091,715 tons. Wire products was second largest with 451,190 tons, then galvanized sheets, 355,129 tons, structural shapes, 347,152 tons, and all other black sheets except for tinning, 273,314 tons.

Dominating the heavy rail market was the requirements for track construction and repair, taking 90 per cent of the total or 2,184,528 of 2,404,464 tons. Almost as prominent was mining and lumbering in the light rail industry, taking 79,684 tons of the 106,279-ton total. Track construction and repair required 848,818 tons of angle bars, and other track accessories, of the 914,011 tons shipped.

Building Bar Consumption Heavier

Building and highway work constituted the bulk of the concrete reinforcing bar tonnage, the former taking 365,472 tons and the latter 215,695 tons of the 671,648-ton total. Black plates for tinning was the only other steel product the consumption of which was concentrated largely in one or two industries. Food and packing industry took 1,102,049 tons of the 1,635,563-ton total, over half the remainder being exported. In fact, black plate for tinning exports totaled 310,917 tons, the largest of any one steel product, and almost 20 per cent of all exports listed.

Wider distribution marked galvanized sheets in 1928. The heaviest direct consuming line was for buildings, erection, framework, trim, etc. Increased buying of galvanized sheets for roofing, siding, downspouting, and other building appurtenances contributed largely to this gain. A total of 238,181 tons of sheets entered this field. Jobbers continued to be the principal consuming channel, however, handling 355,129 tons of gal-

vanized sheets during the past year.

Oil, gas and water uses required 34,567 tons of galvanized sheets and agricultural uses 51,983 tons. Considerable of this tonnage was consumed in building construction and in equipment, such as corn cribs, feed troughs, etc., for the farms, and in tool sheds, movable field offices, etc., for the oil industry.

Of the miscellaneous tonnage reported for 1928, 126,302 tons was diverted to the car and locomotives division of railroad consumption, and 101,317 tons was exported. Jobbers handled 51,703 tons of miscellaneous steel products not classified under the established headings.

Automotive requirements took 63,803 tons of miscellaneous steel in 1928, as compared with 122,840 tons in 1927. Buildings took 48,354 tons in 1928 and 48,782 tons in 1927.

Semifinished steel materials shipped by mills to other companies for further conversion gained slightly in 1928 over 1927. The largest increase was in the wire rod classification, 738,155 tons being shipped in 1928 as compared with 470,002 tons in 1927 and 613,812 tons in 1926. Billet and slab shipments in 1928 also were heavier than either 1927 or 1926, as were sheet and tin bars. Although skelp shipments in 1928 were almost 25 per cent higher than in 1927, they were lower than the 608,031 tons distributed for further conversion in 1926. Following are listed comparisons for 1928 and 1927 of shipments of semifinished steel by reporting companies for further conversion:

	1928	1927
Billets and slabs	1,332,933	1,151,089
Sheet and tin bars	1,183,330	1,177,162
Wire rods	738,155	470,002
Skelp	583,160	466,219

Distribution in Gross Tons of Finished Steel Output in 1928

Shown by Consuming Groups and Individual Product

Compiled from Reports of Companies Controlling 96.04 Per Cent of Country's Steel Ingot Capacity

	Heavy rails	Light rails	Angle bars, steel ties and other track accessories	Plates	Structural shapes	Bars and shapes 3-inch, excepting concrete bars	Concrete bars	Hoops, bands, and cotton ties
1—Railroads								
a Cars and locomotives	66	15	40	595,204	228,522	199,439	.....	8,363
b Track construction and repair	2,184,528	1,602	848,818	15,624	2,351	26,739	2,500	252
c Buildings and bridges	120	36	5	128,297	264,063	89,389	25,784	1,504
2—Buildings	.....	.....	.....	.....	.....	.....	.....	.....
a Erection materials–framework–trim–etc.	2,268	2,858	239	600,451	1,811,169	129,355	365,472	34,673
b Furnishings–metal furniture–stoves–refrigerators–etc	.....	.....	.....	75,492	483	27,788	.....	38,264
c Other pressed metal products for buildings	.....	.....	.....	10,673	21,242	33,508	.....	14,765
3—Highways and highway bridges	.....	.....	.....	5,060	30,565	7,500	215,695	.....
4—Automotive	77	4	101	194,852	29,027	931,160	.....	463,638
5—Oil, gas and water	826	1,419	837	524,890	87,451	54,687	.....	21,930
6—Mining and lumbering	15,936	79,684	15,417	15,440	16,587	12,678	1,500	15,785
7—Agricultural	940	104	149	107,253	28,735	794,582	.....	96,652
8—Shipbuilding	3	2	.....	82,421	33,972	13,312	.....	676
9—Machinery, tools and equipment (including electrical)	594	1,354	134	101,750	79,867	383,744	.....	21,560
10—Food and packing industry	.....	.....	.....	4,633	1,470	2,145	.....	62,519
11—Exports	159,953	9,655	25,646	220,484	168,386	72,205	6,187	18,824
12—Miscellaneous	37,734	3,349	8,280	190,769	136,530	254,680	4,158	71,866
Totals	2,403,045	100,082	899,666	2,873,293	2,940,420	3,002,907	621,296	871,271
Jobbers	1,419	6,197	14,345	212,174	347,152	216,052	50,352	48,466
Grand totals	2,404,464	106,279	914,011	3,085,467	3,287,572	3,218,959	671,648	919,737

	Black plates for tinning	All other black plate and sheets, excepting galvanized sheets	Galvanized sheets	Tubing and pipe	Wire products	Strip steel	All other finished steel products	Grand Totals, all finished products	Per Cent of Total
1—Railroads									
a Cars and locomotives	2	163,429	50,894	36,589	17,187	18,688	126,302	1,364,740	4.77
b Track construction and repair	.....	.....	.....	406	22,018	.....	18,060	3,122,898	10.94
c Buildings and bridges	.....	16,894	4,380	783	5,989	10	20,986	558,240	1.95
2—Buildings	.....	.....	.....	.....	.....	.....	.....	.....	....
a Erection materials–frame-work–trim–etc	4,970	87,301	238,181	137,021	98,263	75,241	40,189	3,627,651	12.71
b Furnishings – metal furniture – stoves–refrigerators–etc	577	320,197	55,104	11,034	49,432	39,909	3,000	621,280	2.18
c Other pressed metal products for buildings	.....	57,388	19,457	1,931	45,227	21,750	5,165	231,106	0.81
3—Highways and highway bridges	.....	9,418	93,387	2,657	11,900	.....	9,940	386,122	1.35
4—Automotive	27,205	1,480,678	7,658	58,657	191,753	960,500	63,803	4,409,113	15.45
5—Oil, gas and water	43,907	101,962	34,567	1,462,189	25,614	2,000	22,700	2,384,979	8.36
6—Mining and lumbering	.....	7,374	5,987	15,427	16,109	1,073	13,132	232,129	0.81
7—Agricultural	.....	53,131	51,983	7,388	538,776	37,391	16,719	1,733,803	6.35
8—Shipbuilding	.....	7,591	1,420	5,414	2,311	.....	3,230	150,352	0.53
9—Machinery, tools and equipment (including electrical)	2	206,543	40,572	84,876	26,973	36,263	18,858	1,003,090	3.51
10—Food and packing industry	1,102,049	180,366	9,834	608	29,681	13,536	33,588	1,368,429	4.79
11—Exports	310,917	94,435	157,330	186,535	130,940	10,549	101,317	1,673,363	5.86
12—Miscellaneous	79,716	520,119	148,592	152,931	452,588	330,363	59,940	2,454,315	8.80
Totals	1,569,345	3,306,826	919,346	2,164,446	1,664,761	1,547,273	556,929	25,445,906	89.17
Jobbers	66,218	273,314	355,129	959,597	451,190	43,407	51,703	3,091,715	10.83
Grand totals	1,635,563	3,580,140	1,274,475	3,124,043	2,115,951	1,590,680	608,632	28,537,621	100.00

Production of Alloy Steel Ingots Increases 97 Per Cent

PROGRESS in the alloy steel industry has been eighteen times as rapid as in the general steel industry during the past fifteen years, according to statistics. This advancement is due in a large measure to a wider knowledge of the technic of heat treating and carburizing and to the installation of furnaces equipped with modern devices for maintaining uniform temperatures. Not only have steels of this grade invaded the automotive, aircraft, railroad and machine tool industries, but they have entered into our daily life as a result of the development of the radio and noncorrosive cutlery and golf shafts.

Alloy steel ingots poured in this country in 1928 totaled 1,838,342 gross tons according to figures furnished by important manufacturers of this grade. Ingots of alloy quality made the year previously, amounted to 931,947 gross tons. The 1928 output of alloy steel ingots, therefore, represents a gain of 97 per cent.

Hot rolled bars, cold drawn bars, sheets, plates, pipe and tubes, wire, hot rolled strip, tool steel and forgings were the principal forms into which the alloy steel made last year was converted.

Automotive Consumption Increases

The heaviest consumer of alloy steel has been the automotive industry and this year has been no exception. During 1928 it used 658,844 tons, which is equivalent to 79.67 per cent of the combined finished tonnage reported. In 1927 this industry used 375,909 tons, or 75.7 per cent of the various products classified. The second largest consumer of alloy steel made in 1928 was the machine tool industry. It absorbed 21,957 tons, or 2.65 per cent of the output in 1928. Export buyers of alloy steel made during the year just closed absorbed 9775 tons or 1.18 per cent. Next in point of tonnage was the railway industry which accounted for 9662 tons or 1.17 per cent. The oil producing industry used 7193 tons, or 0.87 per cent.

Consumption of alloy steel for construction purposes still remains in the background, only 5006 tons or 0.60 per cent being fabricated last year. The agricultural industry used 4042 tons or 0.42 per cent for the manufacture of various implements. The shipbuilding industry is credited with 2331 tons, or 0.28 per cent of the various alloy steel commodities manufactured in the United States during 1928. During 1927 this industry absorbed 0.23 per cent of the national output. Miscellaneous applications of steel of alloy quality for the year just closed amounted to 13.09 per cent.

Figures obtained from various manufacturers in this country disclose that 675,653 tons of the aggregate alloy steel production in 1928 was converted into hot rolled bars. This is equivalent to 81.70 per cent of the national output processed in 1928. The machine tool industry absorbed 10,416 tons in the form of hot rolled bars, or 1.54 per cent of the total tonnage produced last year. Reports show that 8386 tons or 1.24 per cent was exported. Hot rolled bars purchased by the railroad industry amounted to 6850 tons or 1.01 per cent and by the oil producing industry, 6773 tons or 1.00 per cent. The tonnage and percentage of hot rolled bars taken by other industries are shown in the accompanying tables.

Of the 43,311 tons of cold-drawn alloy bars produced in 1928, the automotive industry absorbed 30,970 tons or 71.52 per cent. The machine tool industry took 515 tons, or 1.19 per cent. Approximately 400 tons or 0.92 per cent was shipped to buyers in foreign countries.

The tonnage of sheets listed in the accompanying tables does not include the 1,000,000 tons additional alloy bearing sheets which is produced annually for corrosive resisting and protective purposes. Of the tonnage shown 39.12 per cent was used for construction purposes, 17.57 per cent by the machine tool industry, and 12.66 per cent by the automotive industry. Miscellaneous requirements absorbed 30.65 per cent.

Plates shipped by alloy steel producers in 1928 amounted to 4670 gross tons of which 1624 tons or 34.78 per cent was in the form of beams, channels and other members suitable for the construction of buildings and bridges. The shipbuilding industry used 372 tons or 7.97 per cent. The automotive industry absorbed 190 tons or 4.07 per cent, the machine tool industry 100 tons or 2.14 per cent while other industries not included in the list, used 2379 tons or 50.94 per cent.

Shipments Are Large

Of the 49,026 tons of pipe and tubes made last year, the automotive and airplane industries purchased 44,514 tons, or 90.84 per cent of the total. In 1927 these industries accounted for 30,090 tons of pipe and tubes made of alloy steel. Approximately 71.85 per cent, or 7072 tons of alloy steel wire reported in 1928 was purchased by the automotive industry, the balance or 2770 tons was employed for miscellaneous requirements. The building industry took 573 tons or 64.60 per cent of alloy structural shapes. The automotive industry accounted for 34 tons or 3.84 per cent, the machine tool industry 19 tons or 2.14 per cent, while 261 tons or 29.42 per cent was used for other requirements not listed.

In excess of 75 per cent of all the merchant shapes made in 1928 went into the fabrication of railroad equipment. Hot rolled strip steel of alloy quality produced during the year just closed aggregated 7871 tons. The output on this commodity shipped to the automotive industry was reported as 5247 tons or 66.66 per cent; that to the agricultural industry as 1568 tons or 19.92 per cent; that to the machine tool industry as 621 tons or 7.89 per cent; that for construction purposes as

High Lights of Alloy Steel Industry

	Per cent
National output processed into:	
Hot rolled bars	81.70
Pipe and tubes	5.93
Cold drawn bars	5.23
Forgings	1.76
Tool steel	1.64
Wire	1.19
Hot rolled strip	0.95
Sheets	0.72
Plates	0.56
Merchant shapes	0.18
Structural shapes	0.11
Cold rolled strip	0.03
Consumed by:	
Automotive industry	79.67
Miscellaneous	13.09
Machine tool industry	2.65
Export trade	1.18
Railroad industry	1.17
Oil industry	0.87
Construction industry	0.60
Agricultural industry	0.49
Shipbuilding industry	0.28

35 tons or 0.45 per cent; and that for satisfying all other requirements as 400 tons or 5.08 per cent. Machine tool builders also purchased 262 tons of cold rolled strip steel.

Tool steel of alloy quality manufactured in this country during 1928 by various producers totaled 13,593 tons, or 1.64 per cent of the aggregate output. The machine tool industry purchased 7316 tons or 53.83 per cent of the total. The automotive industry accounted for 2711 tons or 19.94 per cent of all the tonnage made. Approximately 947 tons or 7.11 per cent of the tool steel manufactured went to the railroad industry; 177 tons or 1.30 per cent to the shipbuilding industry; 148 tons or 1.09 per cent to the oil producing fields; 65 tons or 0.48 per cent to the agricultural industry; and 2229 tons or 16.25 per cent to satisfy miscellaneous requirements.

Alloy Steel Output in 1928 by Form

Commodity	Gross tons
Ingots produced	1,838,342
Hot rolled bars	675,653
Pipe and tubes	49,026
Cold drawn bars	43,311
Forgings	14,602
Tool steel	13,593
Wire	9,842
Hot rolled strip	7,871
Sheets	5,923
Plates	4,670
Merchant shapes	1,428
Structural shapes	887
Cold rolled strip	262

Those figures of ingots or finished tonnage disregard sheets of which it is estimated about 1,000,000 tons additional of alloy bearing metal is produced for rust resisting and protective purposes.

The output of forgings of alloy quality in 1928 amounted to 14,602 tons. The quantity used by the machine tool industry was 1667 tons or 11.42 per cent. The quantity of alloy forgings absorbed by the automotive industry was 1573 tons or 10.77 per cent. Export shipments of this commodity amounted to 984 tons or 6.73 per cent. Forgings of alloy steel consigned to the railroad industry aggregated 757 tons, or 5.18 per cent. The shipbuilding industry consumed 790 tons or 5.41 per cent. The oil producing industry used 152 tons or 1.04 per cent, while 34 tons or 0.24 per cent was used in the construction of buildings and bridges. Miscellaneous requirements not included in list accounted for 8645 tons, or 59.21 per cent.

Distribution in Tons of Output of Alloy Steel in 1928

Shown by Consuming Groups and Individual Products

Group	Hot rolled bars gross ton	Cold drawn bars, gross ton	Sheets, gross ton	Plates, gross ton	Pipe and tubes, gross ton	Wire, gross ton
1—Automotive industry	565,783	30,970	750	190	44,514	7,072
2—Machine tool industry	10,416	515	1,041	100	.....	.....
3—Railroad industry	6,850	27	.....	.....	.....	.....
4—Agricultural industry	2,384	25	.....	.....	.....	.....
5—Construction	407	16	2,317	1,624	.....	.....
6—Shipbuilding industry	972	20	.....	372	.....	.....
7—Oil industry	6,773	120	.....	.....	.....	.....
8—Exports	8,386	400	.....	5	.....	.....
9—All other requirements	73,682	11,218	1,815	2,379	4,512	2,770
	675,653	43,311	5,923	4,670	49,026	9,842

Group	Structural shapes, gross ton	Merchant shapes, gross ton	Hot rolled strip, gross ton	Cold rolled strip, gross ton	Tool steel, gross ton	Forgings, gross ton	Total, gross ton
1—Automotive industry	34	.....	5,247	.....	2,711	1,573	658,844
2—Machine tool industry	19	.....	621	262	7,316	1,667	21,957
3—Railroad industry	.....	1,081	.....	.....	947	757	9,662
4—Agricultural industry	.....	.....	1,568	.....	65	.....	4,042
5—Construction	573	.....	35	.....	.....	34	5,006
6—Shipbuilding industry	.....	.....	.....	.....	177	790	2,331
7—Oil industry	.....	.....	.....	.....	148	152	7,193
8—Exports	.....	.....	.....	.....	.....	984	9,775
9—All other requirements	261	347	400	.....	2,229	8,645	108,258
	887	1,428	7,871	262	13,593	14,602	827,068

Distribution by Percentage of Alloy Steel in 1928

Shown by Consuming Groups and Individual Products

Group	Hot rolled bars, per cent	Cold drawn bars, per cent	Sheets, per cent	Plates, per cent	Pipe and tubes, per cent	Wire, per cent
1—Automotive industry	83.74	71.52	12.66	4.07	90.84	71.85
2—Machine tool industry	1.54	1.19	17.57	2.14	.....	.....
3—Railroad industry	1.01	0.06	.....	.....	.....	.....
4—Agricultural industry	0.35	0.05	.....	.....	.....	.....
5—Construction	0.06	0.03	39.12	34.78	.....	.....
6—Shipbuilding industry	0.14	0.04	.....	7.97	.....	.....
7—Oil industry	1.00	0.28	.....	.....	.....	.....
8—Exports	1.24	0.92	.....	0.10	.....	.....
9—All other requirements	10.92	25.91	30.65	50.94	9.16	28.15
	100.00	100.00	100.00	100.00	100.00	100.00

Group	Structural shapes, per cent	Merchant shapes, per cent	Hot rolled strip, per cent	Cold rolled strip, per cent	Tool steel, per cent	Forgings, per cent
1—Automotive industry	3.84	.....	66.66	.....	19.94	10.77
2—Machine tool industry	2.14	.....	7.89	100.00	53.83	11.42
3—Railroad industry	.....	75.77	.....	.....	7.11	5.18
4—Agricultural industry	.....	.....	19.92	.....	0.48	.....
5—Construction	64.60	.....	0.45	.....	.....	0.24
6—Shipbuilding industry	.....	.....	.....	.....	1.30	5.41
7—Oil industry	.....	.....	.....	.....	1.09	1.04
8—Exports	.....	.....	.....	.....	.....	6.73
9—All other requirements	29.42	24.23	5.08	.....	16.25	59.21
	100.00	100.00	100.00	100.00	100.00	100.00

New Open Hearths and Mills Lead in 1928 Expansion Program

By John D. Knox

EXPANSION of facilities and rebuilding to allow for obsolescence in the American iron and steel industry in 1928 were featured by abnormally large additions to existing steel ingot capacity and construction of a slightly more than average number of new rolling mills. Analysis of the industry's building program also shows a moderate resumption in additions to pig iron capacity and market activity in the rehabilitation of blast furnaces, steelworks and rolling mills.

Open-hearth furnaces originally charged last year totaled 13 as shown in Table II. The compilation includes two 300-ton units, five 150-ton units and six 100-ton units. Increased ingot capacity afforded by the completion of these furnaces is estimated at 1,204,500 tons. This compares with 655,000 tons which was added to the national ingot capacity in 1927 as a result of 10 furnaces having been included in the building program.

Eight Furnaces Building

At the beginning of this year as shown in Table III, eight open-hearth furnaces for the production of basic steel were under construction. Three are being built by the Ford Motor Co., Fordson, Mich., one by the Sheffield Steel Corp., Kansas City, Mo., three by the Youngstown Sheet & Tube Co., Indiana Harbor, Ind. and one by the Laclede Steel Co., Alton, Ill.

The total number of basic open-hearth furnaces constructed each year from 1913 to the beginning of 1929 and the gross annual output which has increased the ingot-making capacity of this country, is recorded as follows:

Year	Open hearths completed	Gross tons
1928	13	1,204,500
1927	8	515,000
1926	18	1,327,500
1925	9	630,000
1924	16	1,110,000
1923	8	535,000
1922	7	364,000
1921	13	620,000
1920	26	1,268,000
1919	23	1,871,000
1918	39	2,192,500
1917	102	5,413,000
1916	105	4,300,000
1915	43	1,759,000
1914	9	507,000
1913	62	3,120,000

Pig iron smelting capacity built in 1928 was confined to two stacks. These, as shown in Table IV, were built by the Tennessee Coal, Iron & Railroad Co., Fairfield, Ala., and will add 414,000 tons of pig iron to the national capacity. No new blast furnaces were in the process of construction at the opening of this year, although cost estimates were being compiled for at least two companies which are contemplating new pig iron capacity.

Yearly Additions Compared

Pig iron output in gross tons for all stacks placed in blast each year from 1905 to 1928 inclusive, may be compared in the following table:

Year	Gross tons
1928	414,000
1927	None
1926	1,173,000
1925	241,500
1924	120,750
1923	155,250
1922	None
1921	207,000
1920	1,138,500
1919	596,750
1918	1,425,000
1917	2,182,500
1916	530,000
1915	530,000
1914	None
1913	550,000
1912	1,000,000
1911	565,000
1910	1,794,000
1909	1,930,000
1908	1,188,000
1907	2,065,000
1906	1,135,000
1905	1,292,000

Records of the past year show that 18 obsolete stacks in this country were dismantled or were being dismantled as the year closed. These include the Oxmoor stack of the Tennessee Coal, Iron & Railroad Co., Oxmoor, Ala., the Lochiel stack of the Central Iron & Steel Co., Harrisburg, Pa.; the No. 1 stack of the Carnegie Steel Co., New Castle, Pa.; the LaFollette stack of the LaFollette Coal & Iron Co., LaFollette, Tenn.; the Leesport stack of the Leesport Iron Co., Leesport, Pa.; stacks "D" and "E" of the Bethlehem Steel Co., Lackawanna, N. Y.; the Lebanon stack of the Lavino Furnace Co., Lebanon, Pa.; the Princess stack of the Princess Iron Corp., Glen Wilton, Va.; the Carbon stack of the Carbon Furnace Co. Ltd., Perryville, Pa.; Nos. 1 and 2 stacks of the Temple Furnace Co., Temple, Pa.; the Musconetcong plant of the Musconetcong Iron Co., Stanhope, N. J.; the No. 2 stack at South Chicago, Ill. and the Tod stack at Youngstown, O., of the Youngstown Sheet & Tube Co.; the Crumwold stack of the Reading Iron Co., Emaus, Pa.; and Nos. 1 and 2 stacks of the Warwick Iron & Steel Co., Pottstown, Pa.

Stacks remodeled during 1928 total 12. The majority of these were enlarged and were equipped with modern facilities for cleaning the gas more thoroughly.

Table I

Recapitulation

	Completed 1928	Building 1929
By-product ovens	445	89
Blast furnaces	2	0
Open-hearth furnaces	13	8
Rolling mills:		
Bar	5	1
Billet	1	1
Billet-sheet bar	0	1
Blooming	1	2
Hoop	0	2
Merchant	2	3
Pipe, lapweld	2	0
Rod	1	1
Roughing	2	0
Sheet bar	1	0
Sheet, 2-high hot	0	1
Sheet, 4-high hot	1	0
Sheet, 2-high cold	6	0
Sheet, cluster cold	1	0
Skelp, 4-high	0	1
Strip, 2-high hot	1	3
Strip, 2-high cold	17	5
Strip, cluster cold	10	0
Tin, hot	0	8
Tin, cold	0	5
Tube, seamless	2	0
Total rolling mills	53	34

Coking Capacity Increased

As shown in Table VII, new by-product coke ovens built during 1928 totaled 445. Their combined output added 2,809,500 tons of coke to the national capacity. By-product coke ovens built by iron and steel producers totaled 242 or 54 per cent of the 1928 complement; ovens completed by public utility companies totaled 203 or 46 per cent. Approximately 59 per cent or 1,607,200 tons of by-product coke capacity will be devoted for blast furnace consumption while approximately 41 per cent or 1,139,300 tons annually will be made by the new by-product gas oven plants. During the previous year 925 by-product ovens were completed with a combined rated annual output of 5,879,000 tons of coke, 78 per cent of which was built by blast furnaces and steel works and 22 per

cent by the public utility companies.

Various types of rolling mills built during 1928 totaled 53. This compares with 78 the year before. In addition, seven mills were replaced with more modern units. In Table X are listed the 34 mills which were under construction at the close of 1928. The total number of mills completed or building at the close of the year is made up largely of bar, merchant, 2-high cold strip and cluster cold strip mills. Seven bar and merchant mills were built during 1928 while four were under construction as this year opened.

Strip steel rolling facilities included in the list of rolling mills completed last year again commands attention. One new company entered the industry installing seven sets of roughing and finishing units for the production of cold strip steel. Established companies increased their cold rolling capacity at strip mill departments by the addition of seven mills.

Three basic open-hearth furnaces were scrapped last year, two by the Interstate Iron & Steel Co., South Chicago, Ill. and one by the Donner Steel Co., Buffalo. A skelp mill was abandoned by the Tyler Tube & Pipe Co., Washington, Pa., and three merchant bar mills by the Timken Steel & Tube Co., Canton, O. The Chrome Steel Works, Carteret, N. J., discontinued the operation of its 112-inch plate mill and the forge shop which includes two presses, a steam hammer and two tire mills.

The Pacific Coast Steel Co., San Francisco, Calif., has a bolt plant in the course of construction which is expected to be completed next March. Henry Disston & Sons, Inc., Philadelphia, installed a 6-ton hammer and equipment in its forge shop during 1928. Bliss & Laughlin, Inc. of Harvey, Ill., has under construction a modern plant for manufacturing cold finished steel shafting which it expects to complete some time during March. Electro galvanizing equipment was installed during 1928 by Thomas Steel Co., Warren, O., and the Acme Steel Co., Riverdale, Ill. Republic Iron & Steel Co., completed at its Youngstown, O., division, a new spike factory with a capacity of 750 tons a month. Donner Steel Co., Buffalo, installed equipment which increases its cold finished bar capacity from 1000 to 2000 tons a

Equipment Completed or Building During 1928

Table II

Open Hearths Completed in 1928

Company	Number of furnaces	Rated capacity tons	Annual capacity tons
Columbia Steel Corp., Pittsburg, Calif.	2	150	171,400
Continental Steel Corp., Kokomo, Ind.	1	100	84,000
Interstate Iron & Steel Co., S. Chicago, Ill.	1	100	84,000
Otis Steel Co., Cleveland	3	150	257,100
Timken Steel & Tube Co., Canton, O.	2	100	168,000
Weirton Steel Co., Weirton, W. Va.	2	300	272,000
Wisconsin Steel Co., S. Chicago, Ill.	2	100	168,000
Total	13		1,204,500

Table III

Open Hearths Building Dec. 31

Company	Number of furnaces	Rated capacity tons	Annual capacity tons
Ford Motor Co., Fordson, Mich.	3	100	210,000
Laclede Steel Co., Alton, Ill.	1	100	70,000
Sheffield Steel Corp., Kansas City, Mo.	1	100	70,000
Tulsa Rolling Mills Co., Sand Springs, Okla.	***2	60	80,000
Youngstown Sheet & Tube Co., Indiana Harbor, Ind.	3	150	257,100
Total	8		687,100

***Authorized; not included in total.

Table IV

Blast Furnaces Completed in 1928

Company	Number of furnaces	Rated capacity tons	Annual capacity tons
Hanna Co., M. A., Buffalo	**1	800	276,000
Tennessee Coal, Iron & Railroad Co., Fairfield, Ala.	2	600	414,000

**Replacement.

Table V

Stacks Remodeled During 1928

Company	Number or name
Bethlehem Steel Co., Sparrows Point, Md.	"A"
Bethlehem Steel Co., Steelton, Pa.	"B"
Brooke Iron Co., E. & G., Birdsboro, Pa.	"Brooke"
Davison Coal & Coke Co., Pittsburgh	"Neville"
Gulf States Steel Co., Alabama City, Ala.	"Alabama City"
Illinois Steel Co., Gary, Ind.	No. 11
Illinois Steel Co., S. Chicago, Ill.	No. 10
Jones & Laughlin Steel Corp., Woodlawn, Pa.	"Aliquippa"
Republic Iron & Steel Co., Thomas, Ala.	No. 2
Sloss-Sheffield Steel & Iron Co., Birmingham, Ala.	Nos. 1 and 2
Trumbull-Cliffs Furnace Co., Warren, O.	"Trumbull-Cliffs"
Total	12

Table VI

Stacks Being Remodeled Dec. 31

Company	Number or name
Bethlehem Steel Co., Sparrows Point, Md.	"B"
Carnegie Steel Co., Clairton, Pa.	No. 2
Carnegie Steel Co., Youngstown, O.	No. 2
Illinois Steel Co., Gary, Ind.	No. 11
Youngstown Sheet & Tube Co., Campbell, O.	"A", "B", "C", "D"
Total	8

Table VII

By-Product Ovens Completed, 1928

Company	Number of ovens	Type of ovens	Est. annual coking cap., tons
Brooklyn Union Gas Co., Brooklyn, N. Y.	90	K-B	565,300
Central Public Service Corp., Rockford, Ill.	21	K-B	73,500
Columbia Steel Corp., Provo, Utah	23	K-B	156,100
Connecticut Coke Co., New Haven, Conn.	61	K-B	385,000
Hamilton Coke & Iron Co., Hamilton, O.	45	K-B	291,200
North Shore Coke & Chemical Co., Waukegan, Ill.	31	K-B	115,500
Tennessee Coal, Iron & Railroad Co., Fairfield, Ala.	63	K-B	459,900
Youngstown Sheet & Tube Co., S. Chicago, Ill.	70	K-B	518,000
Zenith Furnace Co., Duluth	41	K-B	245,000
Total	445		2,809,500

Type of ovens: K-B, Koppers-Becker.

Table VIII

Ovens Building Dec. 31, 1928

Company	Number of ovens	Type of ovens	Est. annual coking cap., tons
Central Alloy Steel Corp., Canton, O.	15	K-B	94,200
Philadelphia Coke Co., Philadelphia	74	K-B	464,800
Total	89		559,000

Type of ovens: K-B, Koppers-Becker.

month, and completed a new electric furnace with a daily output of 75 tons. Two electric furnaces of 600 pound capacity also were installed at the plant of Heppenstall Forge & Knife Co., Pittsburgh.

Electric drives were installed on the rerolling mill of the Texas Steel Co., Fort Worth, Tex. Central Iron & Steel Co., Harrisburg, Pa., extended its universal mill shipping house, installed a waste heat boiler at its 126-inch mill and added equipment

Trenton, N. J., division a new tinning shop including equipment replaced obsolete equipment.

Pipe mills at the Benwood plant and the terne plate department at the Beach Bottom division of the Wheeling Steel Corp. were rebuilt. At the company's Yorkville plant four automatic tinning machines and improved cleaning equipment were installed; at the Portsmouth plant a new track spike department was built and new fence weaving machin-

were enlarged and equipped with modern auxiliary facilities. Construction of a high-tension electric power transmission line with the necessary substations was completed by the Carnegie Steel Co. to tie in the Edgar Thomson works at Braddock, Pa., the Carrie furnaces at Rankin, Pa., the by-product coke plant at Clairton, Pa., and the National works of the National Tube Co. at McKeesport, Pa.

At its Steelton plant, Steelton, Pa.,

Rolling Mills Completed or Building During 1928

Table IX

Rolling Mills Completed During 1928

Company	No. mills	Type mills
American Rolling Mill Co., Middletown, O.	1	16″ 4-high hot sheet
American Steel & Wire Co., Cleveland	1	10″ hot strip
American Sheet & Tin Plate Co., McKeesport, Pa.	1	cluster cold sheet
American Steel & Wire Co., Worcester, Mass.	**1	10″ rod
Atlantic Steel Co., Atlanta, Ga.	1	10″ merchant
Barnes Co., Wallace, Bristol, Conn.	1	3½″ cluster cold strip
Bethlehem Steel Co., Lackawanna, N. Y.	**1	36″ blooming
Bethlehem Steel Co., Lackawanna, N. Y.	**1	32″ roughing
Bethlehem Steel Co., Sparrows Point, Md.	2	lapweld pipe
Carnegie Steel Co., Farrell, Pa.	1	24″ roughing
Columbia Steel Corp., Torrance, Calif.	1	36″ blooming
Continental Steel Corp., Kokomo, Ind.	1	18″ sheet bar
Crosby Co., J. D., Pawtucket, R. I.	2	cold strip
Ford Motor Co., Fordson, Mich.	1	10″ rod
Highland Iron & Steel Co., Terre Haute, Ind.	1	10″ bar
Interstate Iron & Steel Co., S. Chicago, Ill.	1	28″ billet
Jones & Laughlin Steel Corp., Woodlawn, Pa.	1	seamless tube
Michigan Steel Corp., Detroit	6	10″ cold sheet
National Tube Co., Lorain, O.	1	32″ roughing
National Tube Co., Lorain, O.	**1	seamless tube
Republic Iron & Steel Co., Warren, O.	1	11″ cold strip
Republic Iron & Steel Co., Warren, O.	2	14″ cold strip
Republic Iron & Steel Co., Warren, O.	2	20″ cold strip
Scullin Steel Co., St. Louis	1	14″ bar
Scullin Steel Co., St. Louis	1	12″ bar
Scullin Steel Co., St. Louis	1	8″ bar
Sharon Steel Hoop Co., Sharon, Pa.	4	10½″ cluster cold strip
Sharon Steel Hoop Co., Sharon, Pa.	4	8½″ cluster cold strip
Sharon Steel Hoop Co., Sharon, Pa.	1	18″ cold strip
Sharon Steel Hoop Co., Sharon, Pa.	2	13″ cold strip
Sharon Steel Hoop Co., Sharon, Pa.	5	10½″ cold strip
Sharon Steel Hoop Co., Sharon, Pa.	2	8½″ cold strip
Texas Steel Co., Fort Worth, Tex.	1	10″ merchant
Thompson Wire Co., Boston	1	4½″ cluster cold strip
Timken Steel & Tube Co., Canton, O.	**1	22″ bar
Timken Steel & Tube Co., Canton, O.	1	28″ bar
Timken Steel & Tube Co., Canton, O.	**1	10″ merchant bar
Timken Steel & Tube Co., Canton, O.	**1	12″ merchant
Timken Steel & Tube Co., Canton, O.	1	36″ seamless tube
Total	53	

**Replacement; not included in total.

Table X

Rolling Mills Building Dec. 31, 1928

Company	No. mills	Type mills
Acme Steel Co., Riverdale, Ill.	1	10″ hot strip
American Steel & Wire Co., Cleveland	1	hot strip
Byers, A. M., Co., Ambridge, Pa.	***1	40″ blooming
Byers, A. M., Co., Ambridge, Pa.	***1	42″ universal
Byers, A. M., Co., Ambridge, Pa.	***1	16″ skelp
Byers, A. M., Co., Ambridge, Pa.	***1	9″ skelp
Carnegie Steel Co., McDonald, O.	1	10″ hoop
Carpenter Steel Co., Reading, Pa.	2	8″ cold strip
Carpenter Steel Co., Reading, Pa.	2	6″ cold strip
Carpenter Steel Co., Reading, Pa.	1	12″ cold strip
Columbia Steel Corp., Pittsburg, Calif.	8	28″ hot tin
Columbia Steel Corp., Pittsburg, Calif.	5	28″ cold tin
Columbia Steel Corp., Pittsburg, Calif.	1	24″ billet-sheet bar
Columbia Steel Corp., Pittsburg, Calif.	1	merchant
Columbia Steel Corp., Pittsburg, Calif.	1	jobbing sheet
National Tube Co., McKeesport, Pa.	1	4-high skelp
Newton Steel Co., Newton Falls, O.	***10	28″ hot sheet
Newton Steel Co., Newton Falls, O.	***10	26″ cold sheet
Roebling's, John A. Sons Co., Roebling, N. J.	1	18″ cont. blooming
Roebling's, John A. Sons Co., Roebling, N. J.	1	rod
Sharon Steel Hoop Co., Sharon, Pa.	1	14″ hot strip
Sheffield Steel Corp., Kansas City, Mo.	1	blooming
Sheffield Steel Corp., Kansas City, Mo.	1	billet
Sheffield Steel Corp., Kansas City, Mo.	1	bar
Tennessee Coal, Iron & Railroad Co., Fairfield, Ala.	1	10″ hoop
Tulsa Rolling Mills Co., Sand Springs, Okla.	***1	billet
Wheeling Steel Corp., Steubenville, O.	*1	16″ 4-high hot strip
Youngstown Sheet & Tube Co., Indiana Harbor, Ind.	1	10″ merchant
Youngstown Sheet & Tube Co., Indiana Harbor, Ind.	1	14″ merchant
Total	34	

*Reported in 1928; not included in total.
***Authorized; not included in total.

for furnishing pulverized coal to all plate mill heating furnaces. It has under construction eight waste heat boilers at the plate mill heating furnaces and six boilers of the same type on its six open-hearth furnaces; a new substation also is being built. A wire netting department and a new machine shop were completed at the plant of Columbia Steel Corp., Pittsburg, Calif. Additional galvanizing equipment for large sizes of wire and hydraulic tension measuring equipment were installed at the Kinkora works of John A. Roebling's Sons Co., Roebling, N. J. At its

ery installed. A rail spike shop also was built by the Scullin Steel Co., St. Louis. Equipment for manufacturing steel piling was installed at the South Side plant and eight additional soaking pits built at the Aliquippa works of Jones & Laughlin Steel Corp.

Four basic open-hearth furnaces were rebuilt at the Edgar Thomson works of the Carnegie Steel Co., Braddock, Pa., and four at the Donora works of the American Steel & Wire Co., Donora, Pa., while ten at the No. 2 open-hearth plant of the Illinois Steel Co., S. Chicago, Ill.,

the Bethlehem Steel Co. completed a coke wharf and screening station at the coke plant and two waste heat boilers and four gas producers at the open-hearth division. At its Lackawanna plant two waste heat boilers were added at the No. 1 open-hearth department, ingot strippers at the open-hearth and bessemer departments and a 72-inch cold saw at the shipping yard. At the Cambria plant, Johnstown, Pa., three 2-strand pig casting machines were built, two waste heat boilers added at the Franklin open-hearth division and improvements and additions made to the mold yard.

The Business Trend

Constructive Factors Dominate Industry

By JOHN W. HILL, Financial Editor

DEVELOPMENTS during the business year of 1928 were predominantly constructive. Industrial volumes were large and in many cases, recordbreaking. Industrial profits increased. Unemployment was corrected. Railroad earnings improved. Commodity exports registered marked expansion, and agriculture enjoyed a good season.

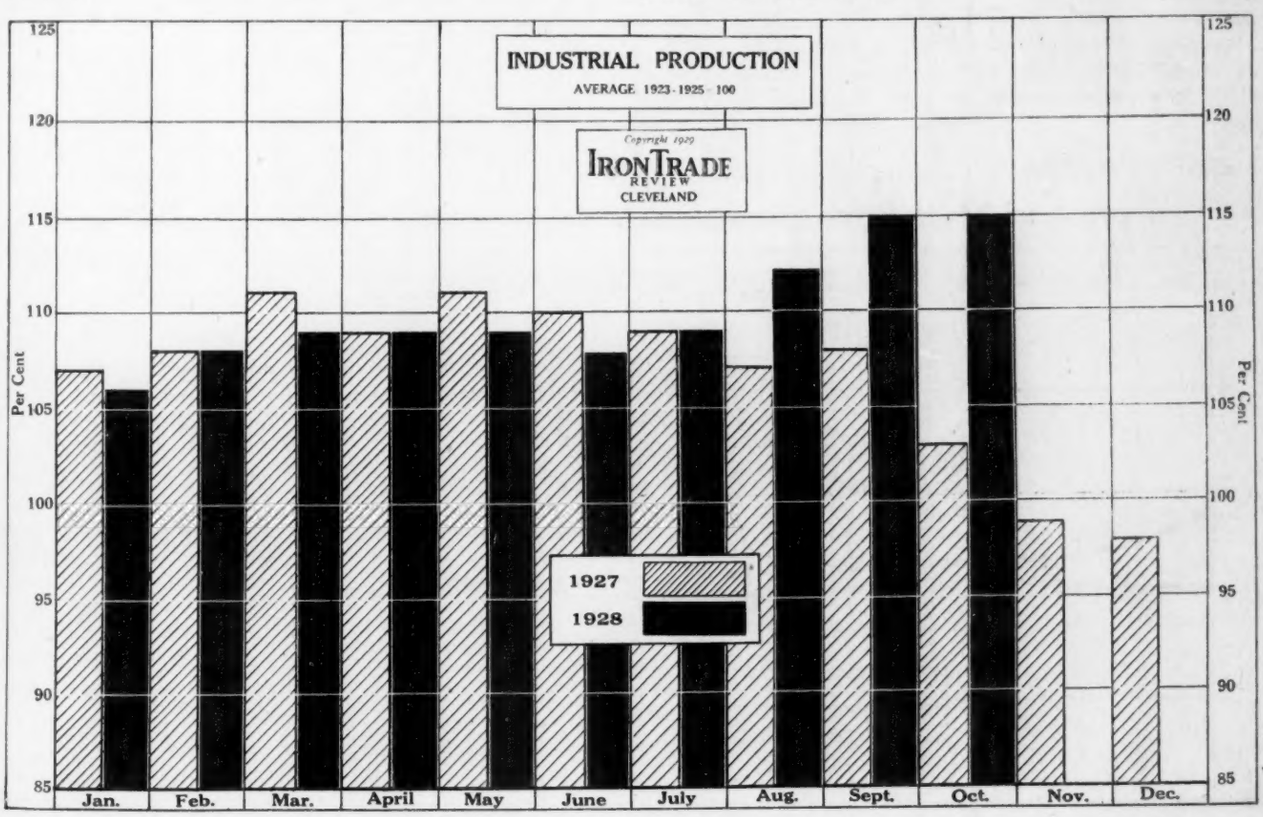
WITH the opening of the new year, industry stands in a sound position. Although production has been exceptional, demand and consumption have kept step. The result is that inventories have not passed moderate limits. At the same time industry has accumulated cash and liquid assets in impressive amounts.

MANUFACTURING establishments also have climbed further in the scale of efficiency. The demand for machine tools and new equipment to reduce unit costs has been extraordinary in recent months. The merger movement, looking toward general manufacturing economies, has spread further.

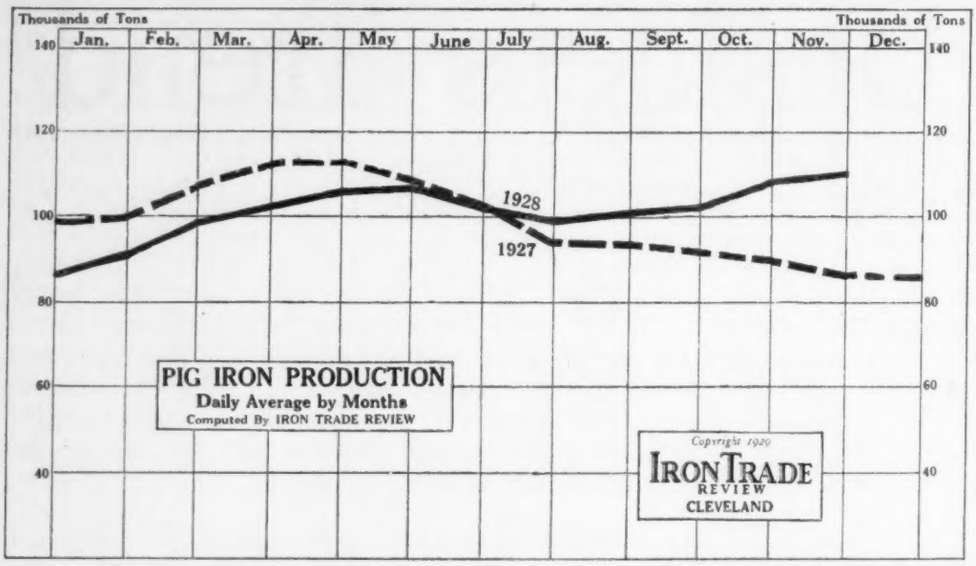
OF DISTINCTLY favorable significance is the rapid progress being made in the final settlement of the economic aftermath of the World war and the apparent nearness of complete stabilization in Europe. World commerce appears already to be feeling the stimulus, and the demand for American products is growing.

THE most pronounced uncertainty of the new year revolves about credit. During 1928 there was a complete reversal from great credit ease to the most pronounced stringency since 1921. This resulted from heavy exports of gold and from gigantic security speculation.

NEITHER building construction nor business as yet has suffered from higher money rates, but this is a factor which will bear careful watching in 1929. Meanwhile there is strong justification for the view that the opening months of the new year will witness continuance of active business, good earnings, and a generally favorable industrial situation.



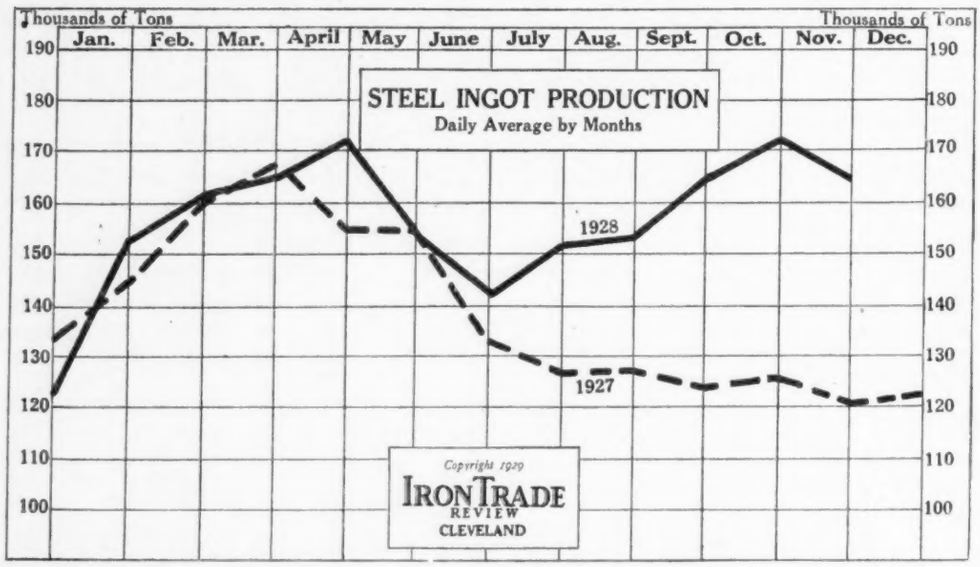
Pig Iron Production Scores Increase in 1928 over Year Before



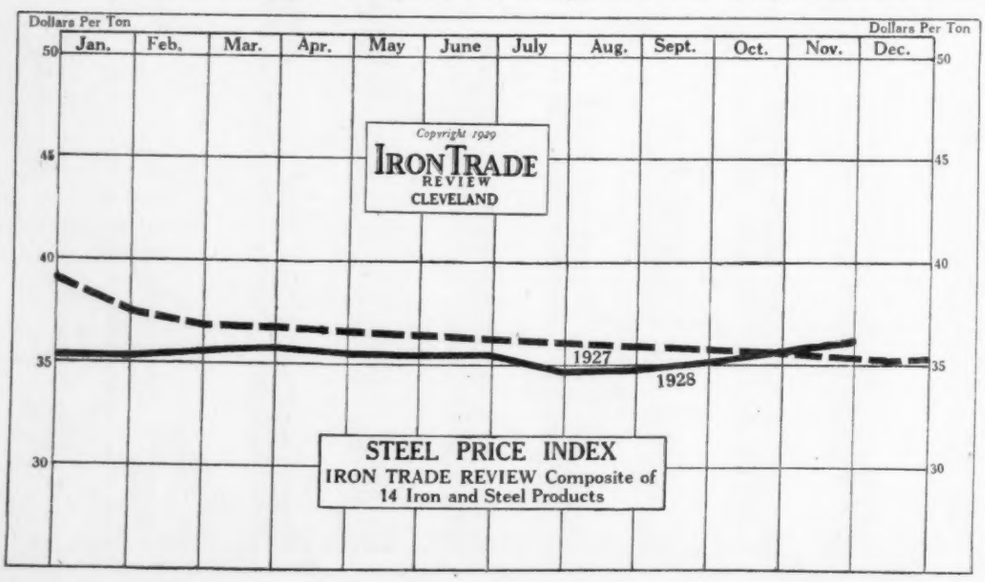
PRELIMINARY estimates of production of coke pig iron in 1928 indicate a total of 37,782,000 tons. This compares with 36,289,112 tons in 1927, and 39,100,941 tons in 1926. The low month of the year was in January with a daily average of 92,113 tons. November's total was the peak with 110,123 tons. The pig iron market witnessed some recovery late in 1928.

Steel Ingot Production Climbs to New Peak In Year Just Closed

DURING 1928 a new record of output of steel ingots and castings was established with a total of 51,400,000 tons. This compared with a total of 44,935,185 tons in 1927 and with 48,293,763 tons in the previous peak year of 1926. A new high mark for all time was established in October with a daily ingot average of 172,144 tons. In the closing months there was some letdown.



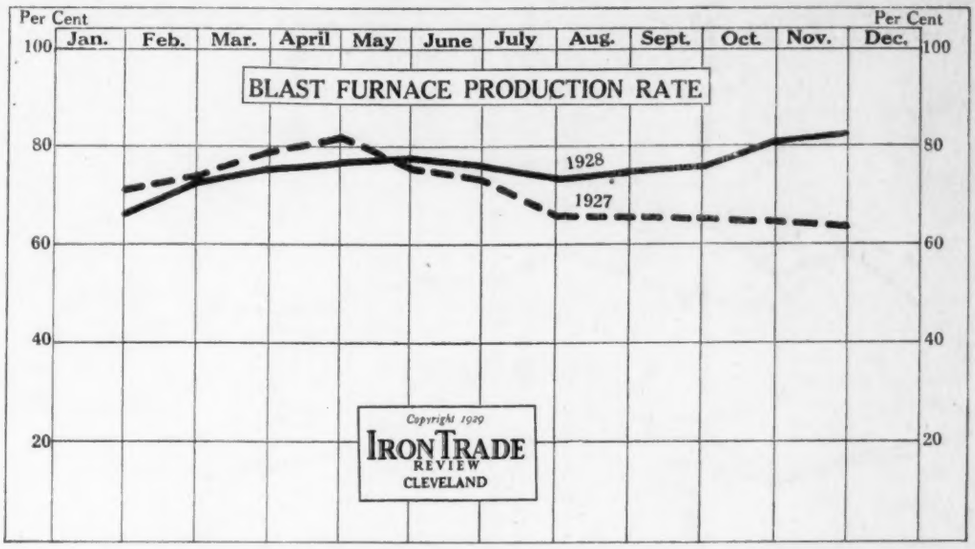
Iron And Steel Price Average Shows Improvement Late in 1928



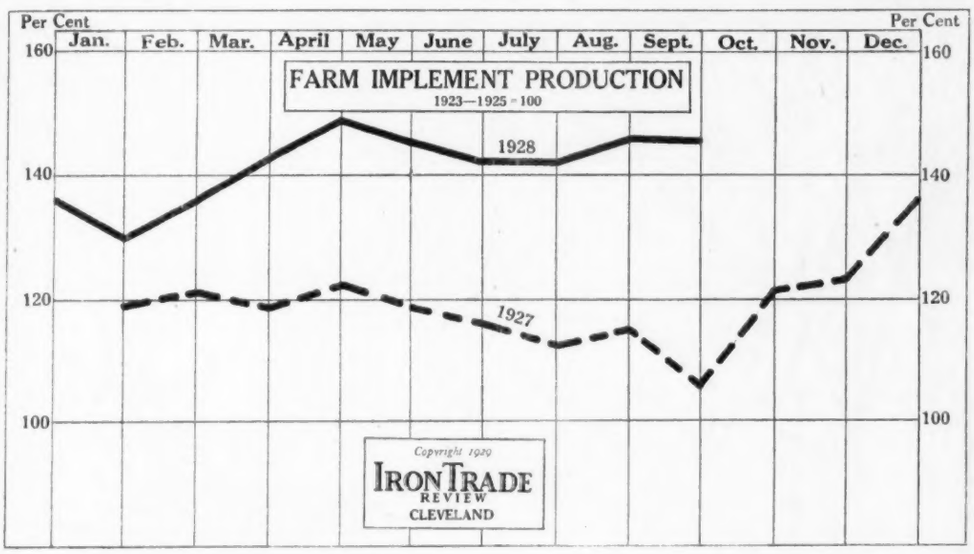
DURING most of 1928 prices of iron and steel products ruled lower than during the corresponding period of one year ago. In August, however, the price index, computed by IRON TRADE REVIEW, *turned upward and by October it had passed the 1927 line. Late in December the index stood at $36.24 against $35.14 one year ago.*

Blast Furnace Production Rate Rises As Pig Iron Demand Gains

DURING 1928 IRON TRADE REVIEW has *been presenting a new series of figures, showing the relation of production of pig iron to the capacity of the country's furnaces. The computation was based on a capacity of* 49,605,720 *tons as of Dec.* 31, 1927. *The figures show a consistently higher level of operations of blast furnaces in* 1928 *than in* 1927.



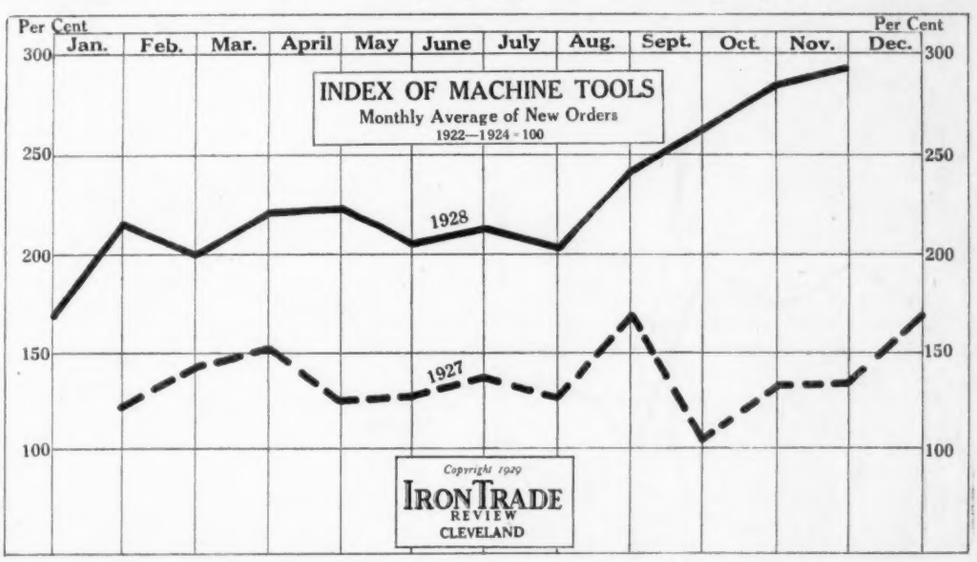
Farm Implement Demand Reflects Improvement in Rural Conditions



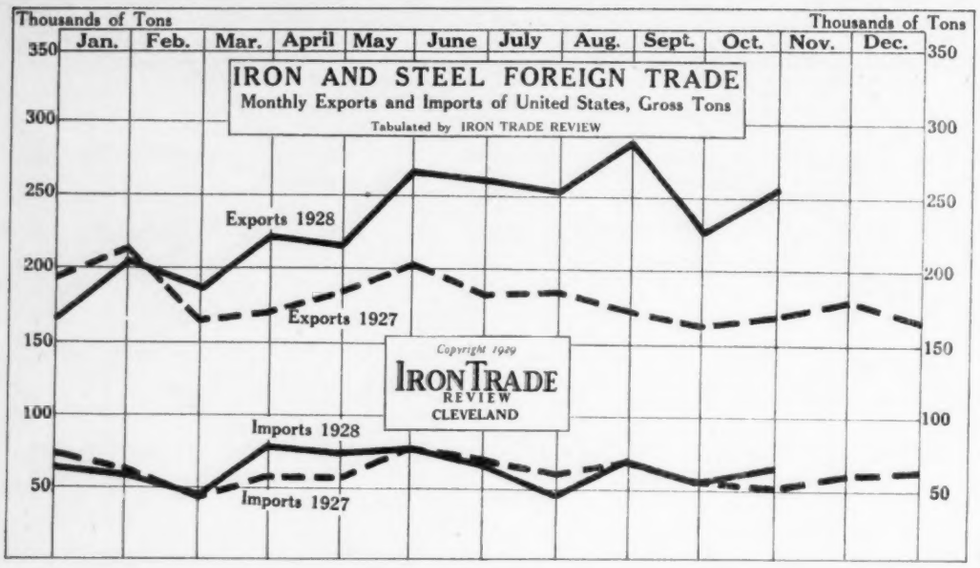
ONE of the important factors in stimulating the iron and steel markets in 1928 *is found in the farm implement industry. The accompanying chart showing an index of production of agricultural machinery reflects important improvement of farm buying power, and progressive machinization of farms which is going on throughout the country.*

Machine Tool Business Greatly Stimulated by Extraordinary Orders

IMPROVED industrial activities together with continuing progress toward higher productive efficiency, have brought about the greatest demand for machine tools of any time since the spring of 1920. *The index of orders compiled by the National Machine Tool Builders' association shows the gain. The motor car industry has been especially active in its demand on tools.*



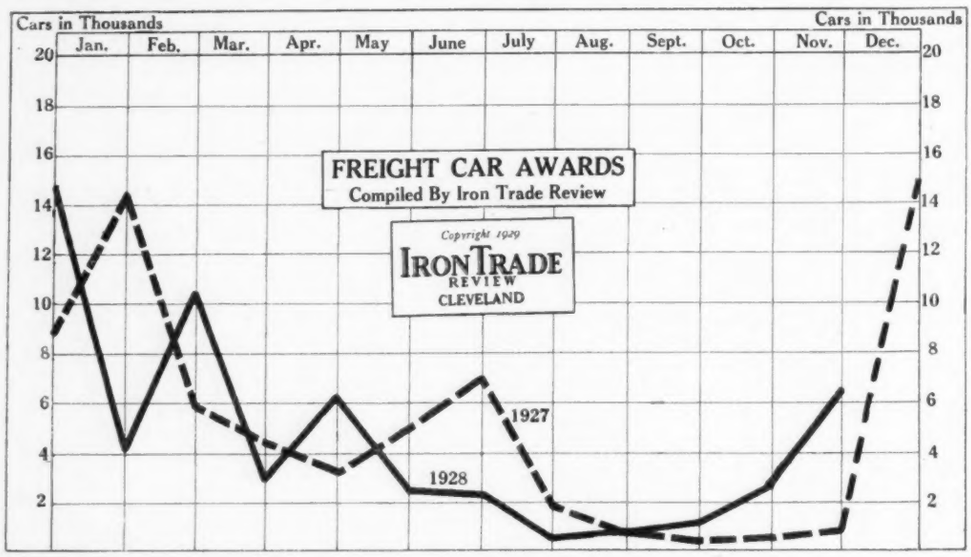
Iron And Steel Foreign Trade Recovers Sharply During 1928



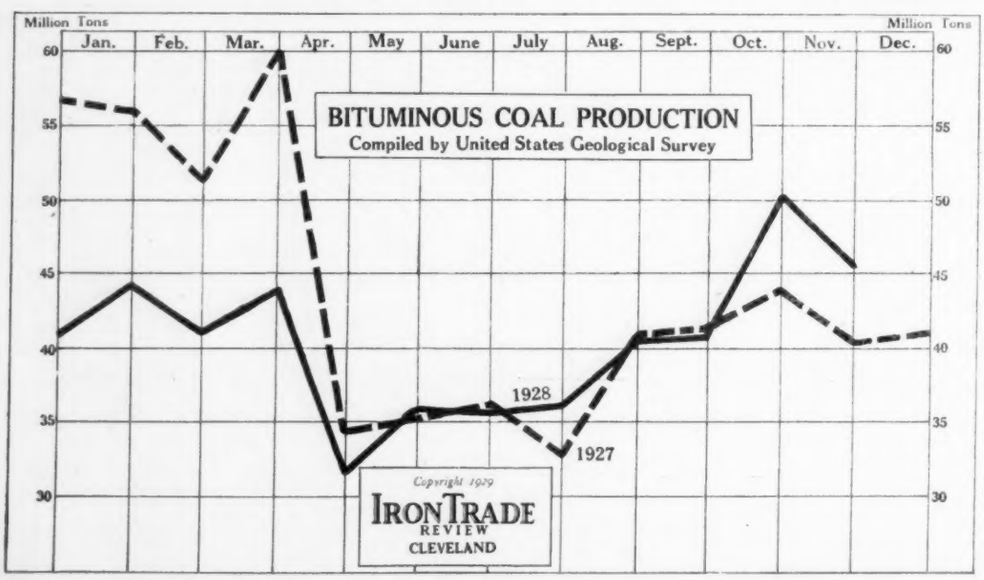
FOR the first 10 months of the year imports of iron and steel totaled 629,301 tons compared with 623,922 tons the like period of 1927. Exports were 2,384,301 tons for the first 11 months compared with 1,836,730 tons for the first 11 months in 1927. The increase for imports was 2 per cent while that for exports was 30 per cent. Pig iron imports gained over 1927.

Railroad Buying of Cars in 1928 Falls Below Preceding Year

PURCHASES of freight cars by the railroads during 1928 declined below the depressed level of 1927. Aggregate awards for new cars for the first 11 months of the year amounted to 39,500 compared with 48,398 for the like period of 1927. In accordance with seasonal tendencies the closing months of the year brought a substantial increase in orders for new equipment.



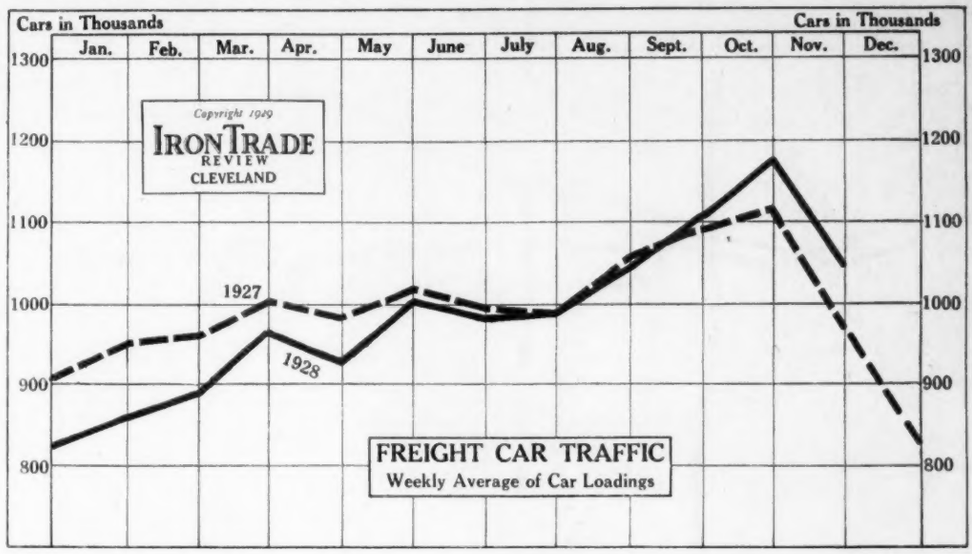
Bituminous Coal Industry Continues Below Normal Level



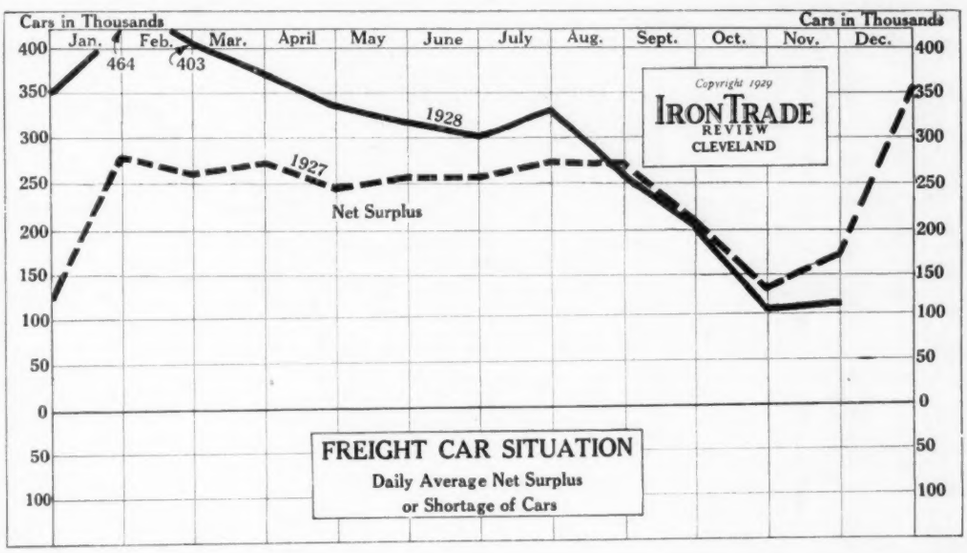
THE outstanding development in the bituminous coal industry in 1928 was the adjustment of the labor difficulties. The market continued under depressed conditions however, due to large over expansion of capacity. Output for 11 months was 450,000,000 tons the lowest production for the period since 1924.

Freight Car Loadings During 1928 Turn Upward Late in the Year

FREIGHT car traffic records in 1928 fell below the levels of 1927 until September. Then, as result of the seasonally high industrial activity, freight car traffic increased over that of one year ago. Total loading for 11 months amounted to 48,062,739 cars compared with 48,379,016 cars in the like period of 1927, a decline of less than 1 per cent for the period.



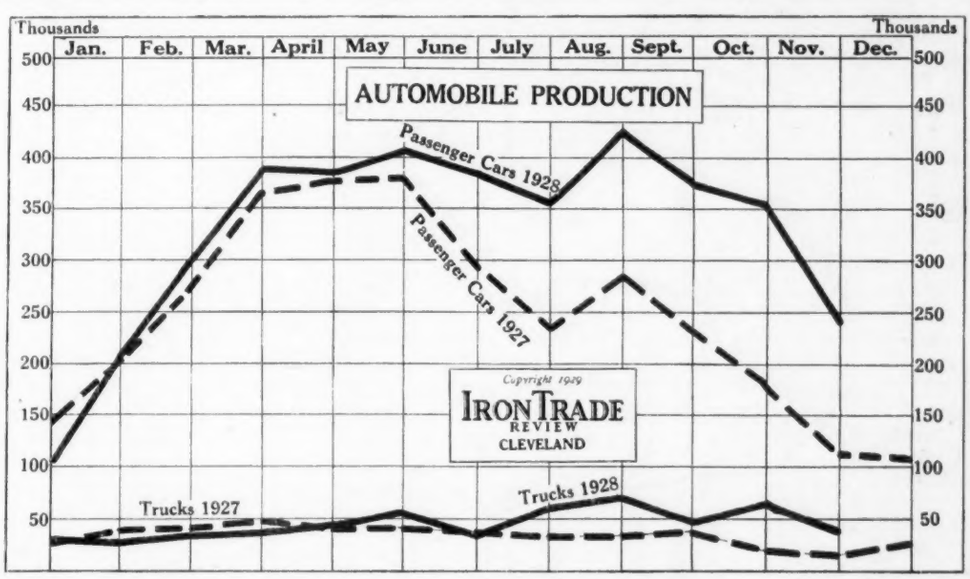
Roads' Surplus of Idle Cars Less in Autumn Than One Year Before



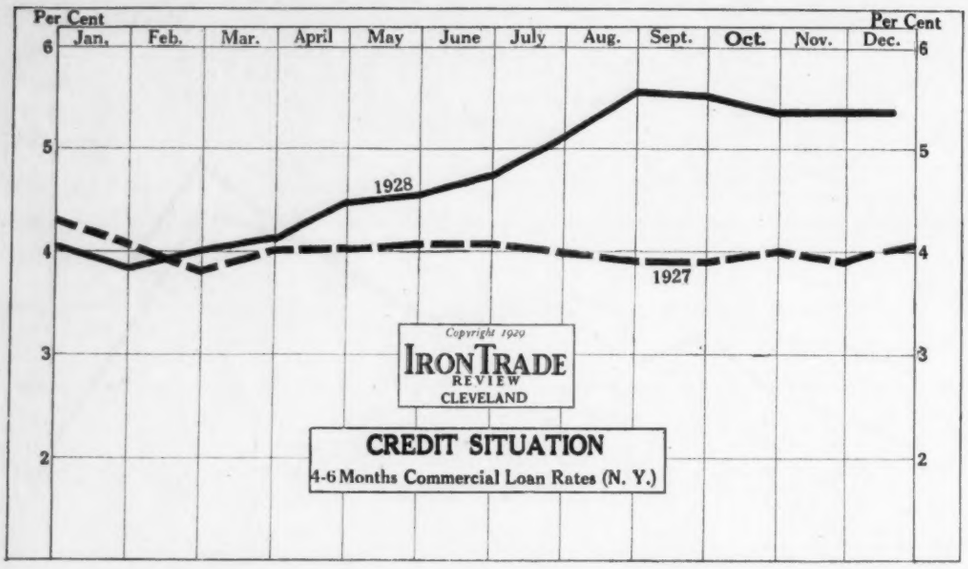
INCREASING transportation requirements of the country during the autumn resulted in a substantial decline in the surplus cars on hands of the railroads. In November, the surplus had declined to 105,000 compared with 464,000 in January and with 168,000 in November 1927. The number of cars in bad order also increased as traffic needs expanded.

Automobile Production Makes New High Record for All Time in 1928

PRODUCTION of approximately 4,600,000 cars and trucks in 1928 compared with 3,580,000 cars and trucks in 1927 and 4,428,000 in 1926, the previous high record. One factor in increasing the output was the production rise of the Ford Motor Car Co. Recent weeks have brought some seasonal slackening in output, but many companies prepare for expansion in the new year.



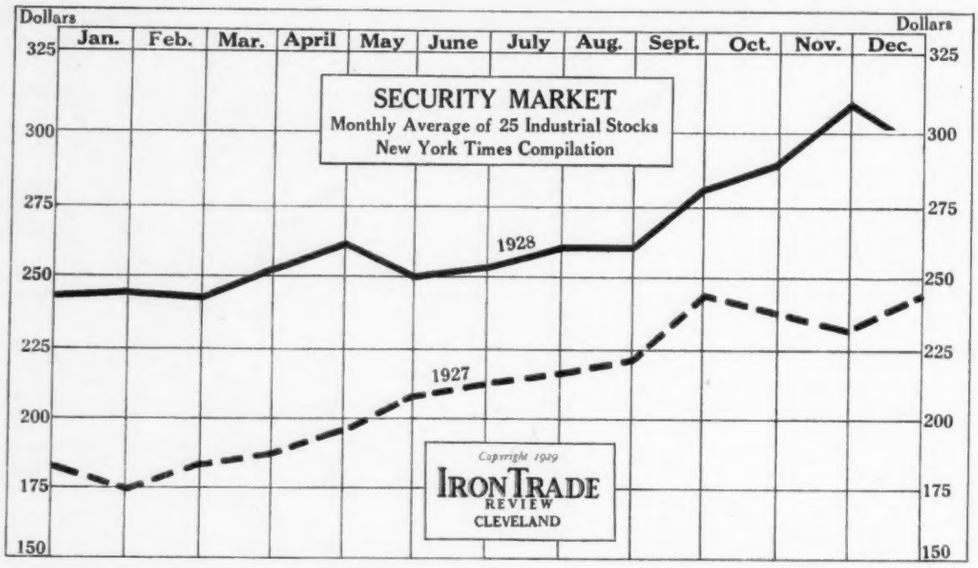
Gold Exports Cause Money Rates to Rise Highest Since 1921



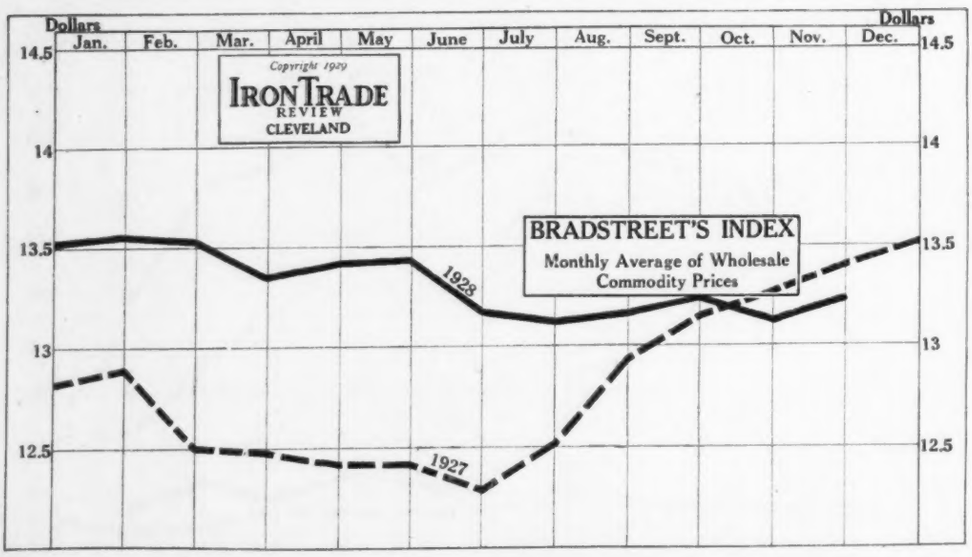
COMPLETE reversal in the credit situation was one of the outstanding developments in 1928. Exports of more than $500,000,000 of gold together with unprecedented security speculation resulted in the highest level of money rates since 1921. No shortage of credit for commerce has appeared, however, and so far business has not been hampered by advanced rates.

Security Prices Continue Great Bull Movement for Most of 1928

DESPITE higher interest rates stock speculation was unprecedented in 1928. There were two reactions, one in June and the other in December. Transactions on the New York stock exchange for the first 11 months of 1928 totaled 826,819,000 shares compared with 513,000,000 shares for the corresponding period of one year before December brought a slower pace.



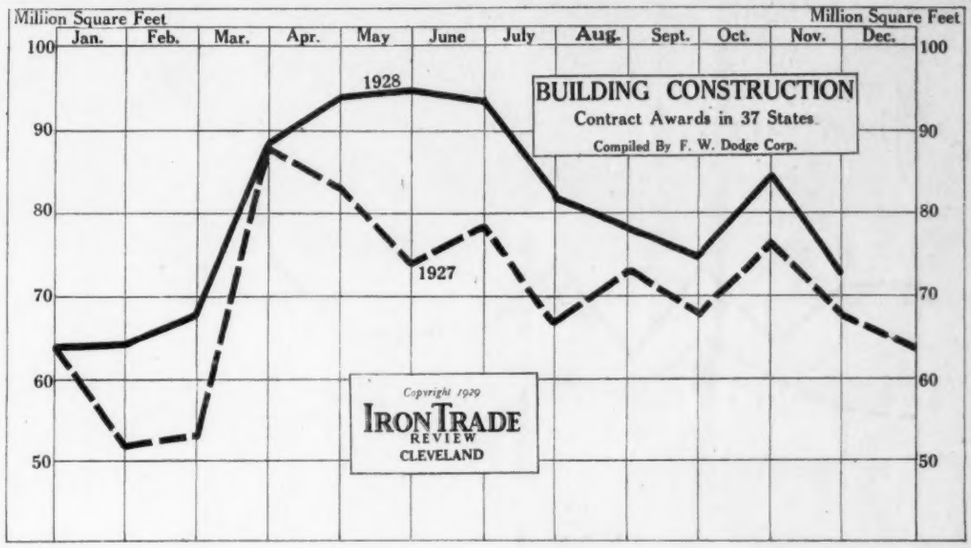
Wholesale Commodity Price Level Holds Fairly Steady in 1928



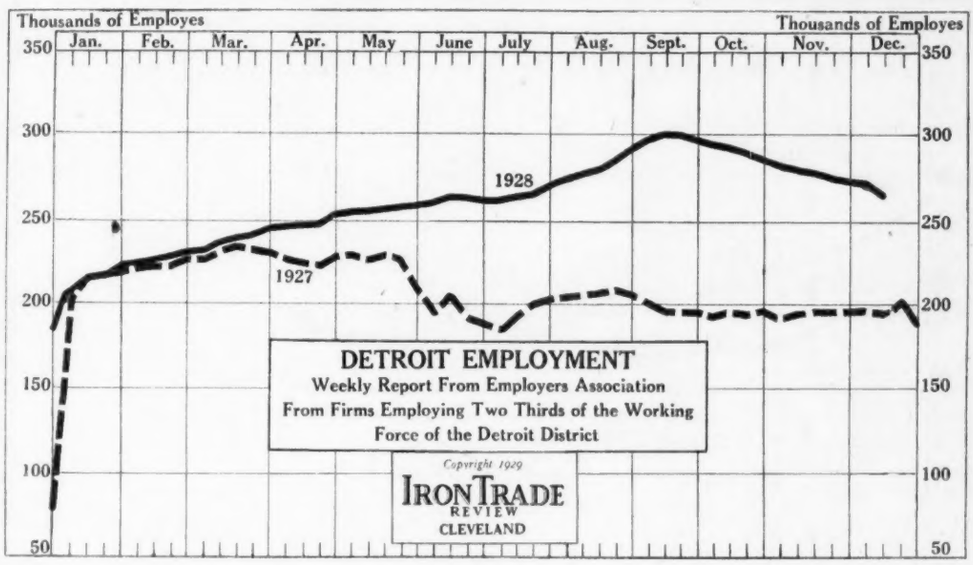
WHOLESALE commodity prices were generally steady during 1928. Bradstreets' index held above the corresponding period of 1927 until October when there was a slight dip. Prices were lower as of Nov. 1 but on Dec. 1 the index showed some recovery. Firmer metal and iron and steel prices have helped to steady the general commodity index late in 1928.

Building Construction Continues at High Plane During Year

BUILDING construction as reported by the F. W. Dodge Corp., for 37 states made a new high record in 1928. Contract awards for 11 months amounted to 901,025,000 square feet, against 787,200,000 square feet, in the corresponding period of 1927 and 819,100,000 square feet, in the like period of 1926. Large scale building activities have continued in the face of higher money.



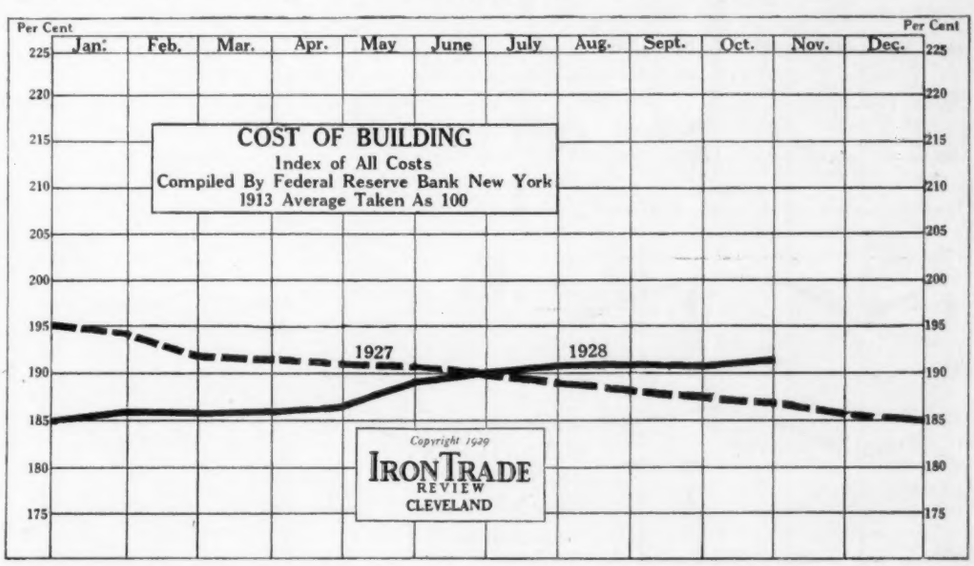
Detroit Employment Reaches Unprecedented Total in 1928



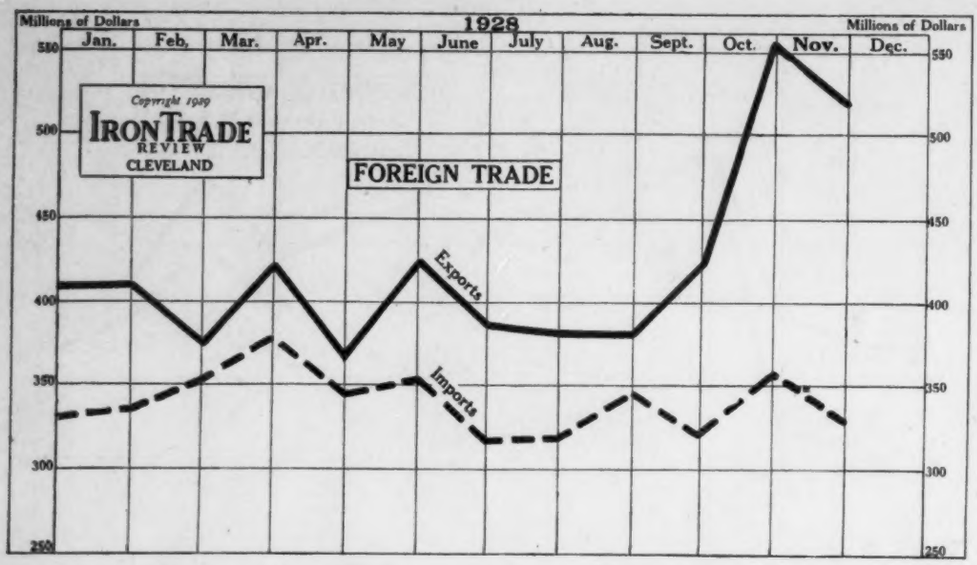
ONE of the most striking developments of 1928 was the impressive rise of employment in the early autumn in the Detroit manufacturing district to over 300,000 a record level. This increase reflected the great expansion of activities in automobile plants. Although there was recession seasonally in the later months of the year employment in the Detroit territory continued to break precedents.

Costs of Building Move Upward, as Materials and Wages Rise

LATE in 1928 costs of building as computed by the Federal Reserve Bank of New York stood at an index of 192. This compared with 187 one year before. Building material prices stood at an index of 164 compared with 158 the year before. Wages of building labor stood at an index of 233 compared with 230 late in 1927. The index of wages is unprecedented.



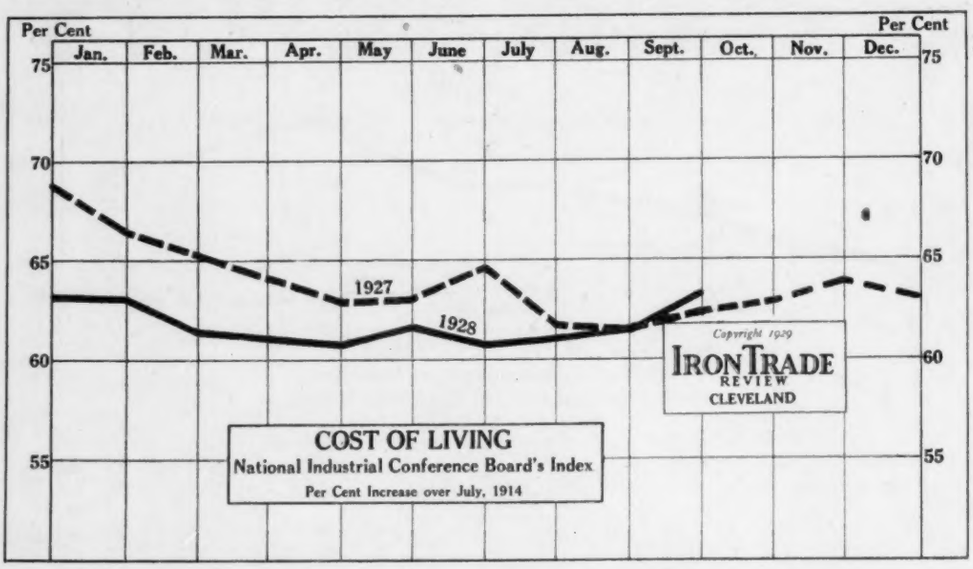
American Exports Climb to New Heights During Last Autumn



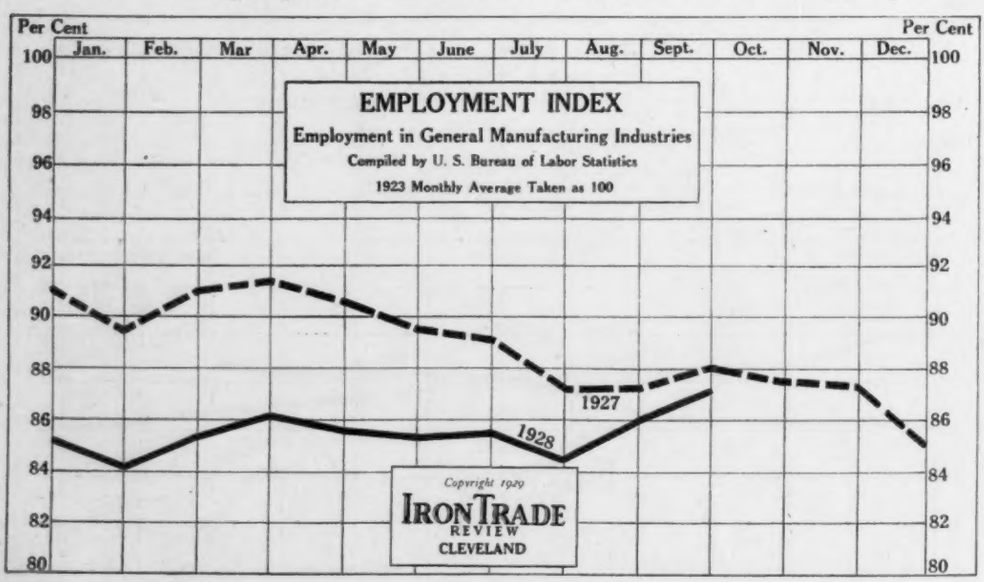
EXPORTS of merchandise from the United States for the first 11 months of 1928 totaled $4,655,459,000. This compared with $4,457,735,000 in the like corresponding period one year ago. Imports were $3,752,451,000 compared with $3,853,509,000 in the like period of 1927. The excess of exports over imports of $903,008,000 compared with $604,246,000 for the same period of 1927.

Living Costs Turn Slightly Upward; Still Below Year Ago

LIVING costs averaging about 63 per cent over 1914 ruled somewhat lower in 1928 than they did one year before. Late this year, however, there was an increase in a number of items sufficient to cause the index, compiled by the National Industrial Conference board, to rise somewhat. The most pronounced change in living cost items has been the drop of rents.



Unemployment Situation Corrected as Industry Moves Ahead



A constructive factor of great importance during 1928 was seen in the correction of the serious condition of unemployment which existed late in 1927 and early in the current year. The general index of employment of manufacturing industries compiled by the U. S. Bureau of Labor Statistics stood at 84.2 in January. By October it was 88 per cent.

Two types of steel construction. Above—A riveted beam. At left—A welded column

Record in Construction *Shows INDUSTRY'S GROWTH*

Steady Upward Trend Maintained in 1928—More Metalworking Projects Up

By George H. Manlove

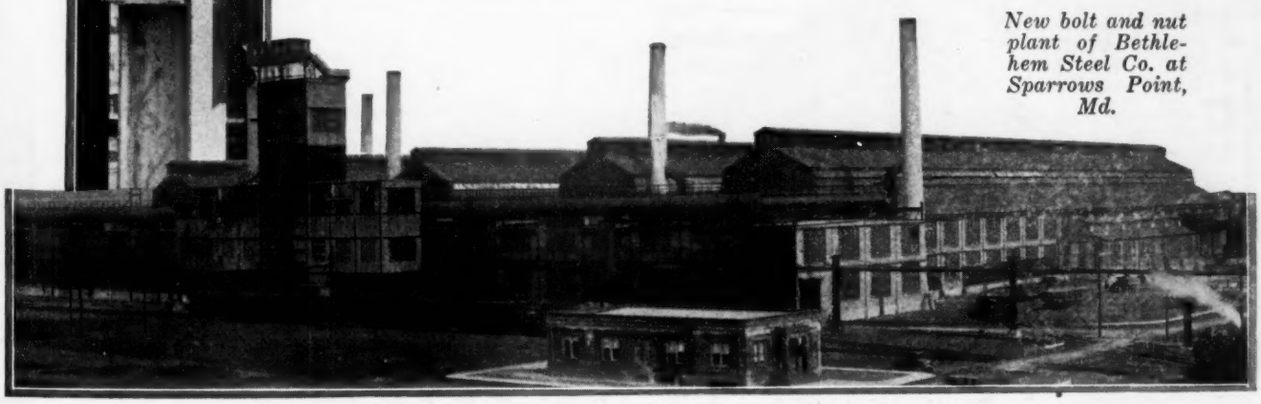
ELEVEN months of 1928 exceeded the entire 12 months of 1927 in the number, cost and floor area of industrial buildings projected and awarded. When the figures for December are assembled and added to the earlier months the year will present a decided gain over the preceding year. Inasmuch as 1927 and 1926 gave practically equal totals in industrial building and each exceeded any year since the boom period of 1919 and 1920, the year just closed in all probability will be the best since the high mark of the expansion period at the beginning of the decade.

April of 1928 gave the largest monthly total of square feet awarded, with one exception, since 1920. The figure for that month was 9,862,200 square feet of floor space, while August, 1922, had a total of slightly more than 10,000,000 square feet.

Industrial construction seems to have settled into a steady stride and annual totals vary little, except for a fairly uniform increase from year to year. The trend upward, which started in 1924, continues steadily and in 1928 eight of the 11 months for which figures are available were above 5,000,000 square feet, five of these exceeding that figure by a large margin. Seasonal influences apparently are having less effect that formerly. January and February of 1928 showed a low mark and May also was low, but there was little decline in the winter months. The low mark in May may have been due to the record of April and was succeeded in June by a total almost equaling that of April.

A feature of the figures is that the record total of square feet awarded in April coincided with the largest number of projects in any month in the year. Seldom do these fall in the same month. It indicates a greater uniformity in the size of projects than has obtained in the past. The relative total of contracts for each month, expressed in square feet of floor area, is shown in the accompanying chart.

The gain in square feet for 11 months of 1928 over all of 1927 is from 58,051,500 to 71,364,200 square feet. The increase



New bolt and nut plant of Bethlehem Steel Co. at Sparrows Point, Md.

Building Contemplated in 1927 and 1928

Figures for 1928 Include Period Jan. 1 to Dec. 1

	No. of projects		Cost of construction	
	1928	1927	1928	1927
Metalworking	1,096	993	$145,103,000	$139,003,700
Miscellaneous and unspecified	1,352	1,438	68,056,300	67,932,600
Food products	997	1,187	56,957,200	68,882,500
Textile, cordage, etc.	300	324	37,309,200	14,459,500
Rubber working	44	43	3,274,000	1,910,500
Oil mills, refineries	34	32	27,646,000	8,702,200
Central heating and power plants	264	266	295,211,700	185,345,800
Chemicals, paints, etc.	226	218	18,043,200	19,118 500
Mining, quarrying, etc.	266	356	41,900,200	45,158,700
Leather working	56	68	2,283,500	2,086,100
Paper and pulp mills	99	95	12,322,800	12,232,500
Printing and binding	145	185	12,025,700	11,493,600
Woodworking	231	291	7,869,500	9,663,800
	5,110	5,496	$728,002,300	$585,990,000

Data supplied by F. W. Dodge Corp.

in number of projects is from 4557 to 4595 and in cost of construction from $376,760,400 to $475,374.000. When the December figures are added 1928 will show a fine increase in all these factors.

The better record of 1928 was due to a consistent increase in practically all subdivisions of industry. Those which fell below the 1927 total, considering 11 months against the full year, were not markedly less and the full figures may bring a reversal of the situation.

In the metalworking field contracts increased from 843 to 1050, in miscellaneous and unclassified projects the increase was from 1160 to 1193 and in oil mills and refineries from 32 to 34. In 1927 the recession from the preceding year was due to slackened construction in metalworking, oil and central heating and power plants. Conditions in these industries seem to have righted themselves somewhat and each has regained part of its former activity.

A comparison of the first 11 months of 1928 as to number of projects and floor space, with monthly averages from 1919, is given in the accompanying table.

In the chart on this page, which is based on data supplied by the F. W. Dodge Corp., 1922, 1923 and 1924 formed a period of building shortage succeeding the readjustment after the war. Confidence was lacking in 1921 and little construction was done. After these three years, during which the country overcame the building shortage and greatly enlarged its facilities, came stabilized prosperity. This era has continued to the present, without deep recessions or high peaks in the charted record. A trend line moving steadily upward may be discerned, in keeping with the growth of industry. This is a steady rise and augurs well for stability. It also visualizes the prosperity of industry as a whole, lack in one branch being balanced by increase in another from year to year.

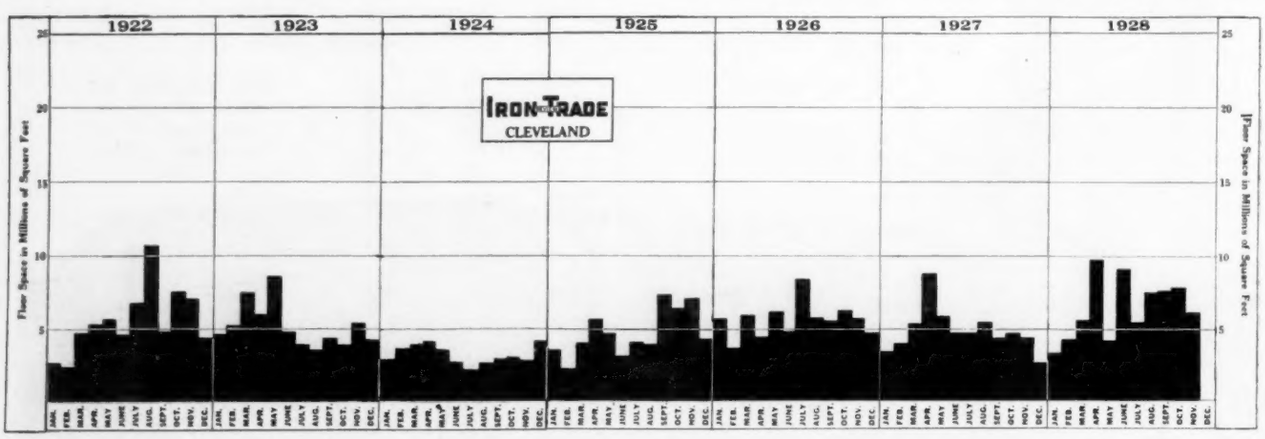
The automotive industry has been a large factor in building for several years. Manufacturers of cars have needed large structures to house their operations and this has added to the total in area and cost more than in number of structures. But the influence of automotive activity has been evident more in the enlargement of facilities for concerns making parts for car manufacturers. Springmakers, body builders, foundries and machine shops producing parts to be assembled at the plant of the car builder have enlarged their plants and built many new ones.

With aviation making growth in much the same way the automotive industry developed two decades ago, a new element is coming into a strong position. Construction of hangars and other airport facilities in referred to elsewhere. But the influence of aircraft manufacture does not end there. Plants for building airplanes necessarily are large and producers of motors and other parts are under necessity of providing larger facilities to supply airplane makers. Production of special steels and other metal alloys is an increasing contribution to industry, calling for some enlargement of facilities.

Apparently more planned construction was actually awarded and built in 1928 than in preceding years. Vicissitudes of business did not seem to have so much effect on plans and a greater proportion was carried through than usual. In the metalworking field

Record of a Decade

Year and month Monthly average	No. of projects	Square feet
1919	636	12,772,000
1920	511	10,652,000
1921	274	2,981,000
1922	323	5,463,000
1923	338	5,184,000
1924	288	3,396,000
1925	356	4,893,000
1926	385	5,655,300
1927	380	4,837,625
1928		
January	308	3,459,900
February	386	4,364,900
March	410	5,682,900
April	439	9,862,200
May	409	4,335,800
June	404	9,094,500
July	357	5,503,000
August	431	7,485,400
September	427	7,584,200
October	552	7,890,400
November	472	6,101,000
December	.....	.....
Total	4,595	71,364,200



Trend of industrial construction. Data by F. W. Dodge Corp.

1096 projects were planned, at a cost of $145,103,000, and 1050 were awarded, at a cost of $104,890,000. Part of this difference will be made up in the December figures. In food products 879 out of 997 projects went through. The estimated cost was $56,957,000 and the contract cost was $58,843,000.

In the case of oil mills and refineries the effect is seen of the movement in the past year to limit output of oil products. While 34 units were projected and 34 were contracted, the estimated cost dropped from $27,646,000 to $5,251,000. This indicates a drastic revision of plans in this department. In central heating and power plants 264 were planned and 209 were awarded. The estimated cost was $295,211,000 and the contract price was $106,627,000. The indication is that several large projects did not reach the stage of award. In mining and quarrying of 266 structures planned 254 were built, and while the estimated cost was $41,900,000 the actual contracts totaled $47,348,000.

Cost Estimations Shrink

Shrinkage in the estimated cost of projects from $728,002,300 to the contracted price of the awarded jobs at $475,374,000 was greater proportionately than the drop from 5110 projects contemplated to 4595 awarded.

A factor in industrial building which accounts for part of the additional construction is the tendency of many large concerns to erect branch plants at places remote from the main works, in sections of the country where consumption is heavy. It is found advantageous to transport raw materials to a central point in the consuming area and ship the completed product to the consumer, giving him better service than from a distance and saving in total freight charges.

Perhaps the most striking example of this tendency is the building of large branch plants on the Pacific coast. A number of manufacturers of various products—metals, rubber, glass and automotive—have established plants in industrial centers from Los Angeles to Seattle to serve the growing population of that section more acceptably than could be done from eastern plants. These plants are in addition to the natural enlargement of establishments already situated there, which are being enlarged as demand increases.

Building costs did not vary greatly from the preceding year, materials and labor being in much the same position. A stable market was assured in both these lines and from that point of view there was no incentive to expedite or defer construction as there was no likelihood of cost changing materially in either direction. Efforts to lengthen the building season by continuing construction into the winter months, to the end that material suppliers and workers might have steadier employment, seem to have been developed to a large degree. The lack of decline in awards toward the end of the year is an indication of this effort's success.

Labor conditions continued undisturbed through the entire year. Strikes were few and of little importance. No trouble was experienced from deliveries of materials, transportation lines being in excellent position to move tonnage promptly. Manufacturers of building materials were not pressed for delivery and were able to handle all that was offered them.

A feature of the year has been progress in the application of welding to structural work. This relatively new method of joining structural members has been subjected to research and laboratory work and its application has been widened by use in the field in actual construction. A commercial building at Cleveland is the first to use this method.

A developing branch of construction which has made strides in the year has been that of airports and hangars. These structures open up a new field in large structures without interior pillars.

One factor relied on to support construction in 1928, which failed to come up to expectations, was a better condition in the oil industry. Overproduction continued and efforts of refiners to limit this evil as far as conditions would allow were responsible for a lessened total of building. The future is not clear and it may be some time before additional facilities will be required, with resultant increased building for refineries. More tanks and pipe lines gave a large tonnage of steel plates but actual construction of buildings was small.

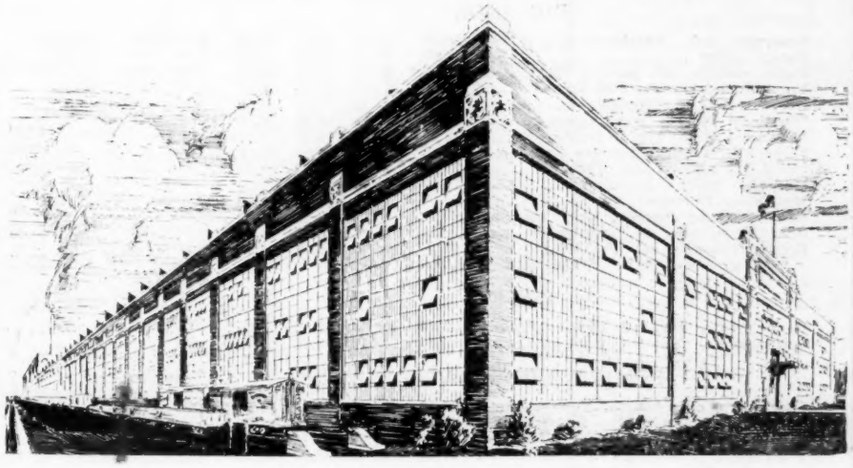
As a whole, 1928 offered an excellent total of construction work. Without a boom or a bulge, it exceeded the record of preceding years and pursued an even course, valuable to the builder, the owner and the maker of materials. While a normal condition is difficult to define, the situation at present seems worthy of being called normal, in that it has no unusual conditions and progress is uninterrupted and steady.

Construction Awarded in 1927 and 1928

Figures for 1928 Include Period from Jan. 1 to Dec. 1

	No. of projects		Cost of construction	
	1928	1927	1928	1927
Metal working	1,050	843	$104,890,100	$100,716,000
Miscellaneous and unspecified	1,193	1,160	54,192,200	50,561,100
Food products	879	981	58,943,800	48,490,000
Textile, cordage, etc.	242	233	35,619,900	10,231,100
Rubber working	46	37	1,932,600	2,225,900
Oil mills, refineries	34	32	5,251,000	4,296,500
Central heating and power plants	209	233	106,627,300	74,433,500
Chemicals, paints, etc.	215	194	33,215,200	14,519,000
Mining, quarrying, etc.	254	302	47,348,600	38,699,200
Leather working	43	55	1,798,500	1,872,100
Paper and pulp mills	96	80	10,059,300	10,787,400
Printing and binding	126	174	9,860,100	13,250,600
Woodworking	208	233	5,635,400	6,678,000
	4,595	4,557	$475,374,000	$376,760,400

Data supplied by F. W. Dodge Corp.



New plant to be built by Chase Brass & Copper Co. at Cleveland

Steel Hopes High as 1929 Opens

Rebound from Holiday Dip Likely to be Swift—Much Pig Iron Moving—Over 10,000 Cars Pending—Automotive Needs Are Promising

PROVERBIAL high expectations of the iron and steel industry for an improved market situation with the new year are unusually well grounded this time. Among producers and consumers alike there is strong confidence that, with inventory-taking, shutdowns for repairs and holiday interruptions past, not only a good January but also an excellent first half year looms up.

Steel Specifications Already Are Broadening

Production of such products as track material and tin plate promises to be seasonally high in the coming half. Automotive specifications for bars, sheets and strip already are expanding, and if the industry's record program materializes it will again dominate the steel markets. With building projects numerous, shipbuilding reviving and some large pipe lines maturing, steelmakers believe they are about to pick up the thread of last year's record gait.

Pig iron shipments have been exceptionally heavy, considering the season, in the past week and prices generally are firm. Dealer claims of a shortage of iron and steel scrap and probable consequent higher prices have an increasing basis.

Car builders at Chicago have specified 4000 to 5000 tons of plates and contracted for an equal amount. Thirty-four thousand tons of structural shapes for New York subways approach the award stage. Freight car inquiry is put well over 10,000 by 2725 freight cars for the Illinois Central and 2000 for the Chicago & North Western.

Europe Also Opens New Year Auspiciously

The promise of the European iron and steel markets also is bright. British steel production is increasing and imports are decreasing. Prices on the Continent are strong. The arbitrator in the Ruhr controversy has compromised, granting some advance in wages and reduction in hours.

Steel corporation subsidiaries and independents are operating this week at 86 per cent.

IRON TRADE REVIEW composite of 14 leading iron and steel products opens the new year with a rise of 1 cent, to $36.25. A month ago this index stood at $36.16 and a year ago at $35.27.

Comparative Prices of Iron, Steel and Coke

Representative Market Figures for This Week, Last Month, Three Months and One Year Ago

	Jan. 2, 1929	Dec., 1928	Oct., 1928	Jan., 1928
PIG IRON				
Bessemer, del., Pittsburgh	$20.01	20.01	19.11	19.26
Basic, valley	17.50	17.50	16.85	17.00
Basic, eastern, del. eastern Pa.	19.75	19.75	19.75	19.50
No. 2 foundry, del., Pittsburgh	19.76	19.76	18.76	19.01
No. 2 foundry, Chicago	20.00	20.00	18.80	18.50
*Southern No. 2, Birmingham	16.50	16.50	16.25	16.00
*Southern Ohio, No. 2 Ironton	18.50	18.50	18.60	19.00
**No. 2X, Virginia furnace	21.25	20.50	20.50	20.50
**No. 2X, eastern, del. Phila.	22.01	22.01	21.26	20.51
Malleable valley	18.00	18.00	17.35	17.25
Malleable, Chicago	20.00	20.00	18.80	18.50
Lake Superior charcoal, del. Chicago	27.04	27.04	27.04	27.04
Gray forge, val., del. Pittsburgh	18.76	18.76	18.26	18.51
Ferromanganese, del. Pittsburgh	109.79	109.79	109.79	104.79
*1.75 to 2.25 silicon. **2.25 to 2.75 silicon				
COKE				
Connellsville, furnace, ovens	2.75	2.75	2.80	2.70
Connellsville, foundry, ovens	3.75	3.75	3.75	3.75
SEMIFINISHED MATERIAL				
Sheet bars, open-hearth, Youngstown	34.00	34.00	33.00	34.00
Sheet bars, open-hearth, Pittsburgh	34.00	34.00	33.00	34.00
Billets, open-hearth, Pittsburgh	33.00	30.00	32.75	33.00
Wire rods, Pittsburgh	42.00	42.00	42.00	41.50

	Jan. 2, 1929	Dec., 1928	Oct., 1928	Jan., 1928
FINISHED MATERIAL				
Steel bars, Pittsburgh	1.90	1.90	1.95	1.80
Steel bars, Chicago	2.00	2.00	2.00	1.90
Steel bars, Philadelphia	2.27	2.27	2.27	2.12
Iron bars, Chicago	2.00	2.00	2.00	1.90
Shapes, Pittsburgh	1.90	1.90	1.95	1.80
Shapes, Philadelphia	2.06	2.06	2.08	2.08
Shapes, Chicago	2.00	2.00	2.00	1.90
Tank plates, Pittsburgh	1.90	1.90	1.95	1.80
Tank plates, Philadelphia	2.10	2.10	2.15	2.05
Tank plates, Chicago	2.00	2.00	2.00	1.90
Sheets, black, No. 24, Pittsburgh	2.85	2.85	2.70	2.80
Sheets, blue anl., No. 10, Pittsburgh	2.10	2.10	2.00	2.10
Sheets gal., No. 24, Pittsburgh	3.60	3.60	3.50	3.65
Sheets, black, No. 24, Chicago	3.00	3.00	2.90	3.05
Sheets, blue anl., No. 10, Chicago	2.25	2.25	2.15	2.25
Sheets, galvanized, No. 24, Chicago	3.75	3.75	3.65	3.90
Plain wire, Pittsburgh	2.50	2.50	2.40	2.40
Wire nails, Pittsburgh	2.65	2.65	2.55	2.50
Tin plate, per base box, Pittsburgh	5.35	5.35	5.25	5.25
SCRAP				
Heavy melting steel, Pittsburgh	18.50	17.40	17.35	15.35
Heavy melting steel, eastern Pa.	16.00	15.35	16.00	14.00
Heavy melting steel, Chicago	14.50	14.50	13.75	12.25
No. 1 wrought, eastern Pa.	15.50	15.50	15.50	15.25
No. 1 wrought, Chicago	14.50	14.50	13.50	12.65
Rails for rolling, Chicago	17.00	16.50	16.40	15.00

Current Prices for Rolled Steel Products

PRICES IN CENTS PER POUND UNLESS OTHERWISE INDICATED

STEEL PLATES

Pittsburgh, base	1.90c to 2.00c
Philadelphia, del.	2.10c to 2.20c
New York, del.	2.175c to 2.275c
Boston, del.	2.265c to 2.415c
Chicago, base	2.00c to 2.10c
Cleveland, delivered	2.09c to 2.19c
Lackawanna, N. Y., base	2.00c to 2.10c
Birmingham, base	2.15c to 2.25c
Coatesville, Pa., base	2.00c to 2.10c
Pacific Coast, c.i.f.	2.20c to 2.30c

STRUCTURAL SHAPES

Pittsburgh, base	1.90c to 2.00c
Philadelphia, del.	2.00c to 2.16c
New York, del.	2.145c to 2.195c
Boston, del.	2.265c to 2.415c
Chicago, base	2.00c to 2.10c
Cleveland, delivered	2.09c to 2.19c
Lackawanna, N. Y.	2.00c to 2.10c
Birmingham, base	2.15c to 2.25c
Bethlehem, Pa., base	2.00c to 2.10c
Pacific Coast, c.i.f.	2.35c

BARS

SOFT STEEL

Pittsburgh, base	1.90c to 2.00c
Chicago, base	2.00c to 2.10c
Birmingham, base	2.15c to 2.25c
Lackawanna, N. Y., base	2.00c to 2.10c
Pacific Coast, c.i.f.	2.35c
Cleveland, base	1.90c to 1.95c
Philadelphia, del.	2.22c to 2.32c
New York, delivered	2.24c to 2.34c
Boston, delivered	2.265c to 2.415c
Pittsburgh, cold finishing	2.05c
Pittsburgh, forging quality	2.15c

RAIL STEEL

Chicago Heights	1.95c
Eastern mills	1.85c

IRON

Chicago, base	2.00c to 2.10c
New York, delivered	2.19c to 2.24c
Philadelphia, delivered	2.17c to 2.22c
Pittsburgh, refined	2.75c to 4.25c

REINFORCING

Pittsburgh billet, cut lengths	2.25c
Stock lengths from mill	2.00c
Chicago, billet	2.35c to 2.60c
Chicago, rail steel	2.05c
Chicago, rail steel, road and bridge work	1.95c to 2.05c
Philadelphia, cut lengths	2.57c

COLD FINISHED STEEL

Cold finished steel bars, drawn or rolled, Pitts., Chi., c.l.	2.20c
Shafting (turned, polished) Pittsburgh	2.20c
Shafting (turned, ground) mill (Depending on size, 1 3/16 to 7-inch)	2.55c to 3.00c
Cold finished steel bars, Cleve.	2.25c

TIN AND TERNE PLATE

Prices per 100-pound box Pittsburgh

*Tin plate, coke base	$5.35

Gary, Ind., base 10 cents higher.

Long ternes, primes, No. 24.. 4.00c to 4.10c

*Price subject to quantity differentials.

SHEETS

SHEET MILL BLACK

No. 24, Pittsburgh base	2.75c to 2.85c
No. 24, Philadelphia, delivered	3.17c
No. 24, Gary, Indiana Harbor	2.95c
No. 24, Chicago, delivered	3.00c
No. 24, Birmingham, base	3.00c

TIN MILL BLACK

No. 28, Pittsburgh, base	3.00c
No. 28, Gary, base	3.10c

GALVANIZED

No. 24, Pittsburgh, base	3.50c to 3.60c
No. 24, Philadelphia, delivered	3.92c
No. 24, Gary, Indiana Harbor	3.70c
No. 34, Chicago, delivered	3.75c
No. 24, Birmingham, base	3.75c

BLUE ANNEALED

No. 10, Pittsburgh base	2.00c to 2.10c
No. 24, Philadelphia, delivered	2.42c
No. 10, Gary, Indiana Harbor	2.20c
No. 10, Chicago, delivered	2.25c
No. 10, Birmingham, base	2.25c

AUTOMOBILE

No. 20, Pittsburgh, base	4.10c

FURNITURE

No. 24, Grade A, Pittsburgh	3.90c to 4.00c
No. 24, Grade B, Pittsburgh	3.75c to 3.85c

(Turn to the following page)

Pig Iron

Outlook Good for First Quarter—Makers Well Booked, and Stocks Low—Market Quiet, and Prices Steady—Shipments Heavy

PIG iron producers look forward to an active first quarter. Conditions at this time are highly favorable to them, with stocks reduced to the lowest point in years, order books bulging, and practically no competition in sight from steelworks furnaces. Big motorcar programs and activity in other important consuming lines forecast heavy shipments of pig iron. December shipments were below those of November mainly because of inventories; the decrease in the Chicago district was less than 10 per cent of the November total. Current sales are light. While most of the tonnage required for first quarter has been covered, a fair run of spot business is anticipated.

PIG IRON PRICES, PAGE 63

PITTSBURGH, Dec. 31.—While the pig iron market is seasonally quiet, prices are firm. Specifications on contracts continue heavy. Small lots of foundry iron are being sold at $18, base, valley. Bessemer iron is $18.25 to $18.50, valley, and basic $17.50 to $18. Malleable is $18 to $18.50. Consumption is maintained at a high rate.

New York, Dec. 31.—While new pig iron buying is small, producers report unusually heavy shipments. Specifications against first quarter contracts are well in hand. Buffalo foundry iron is $18, base, furnace, with occasional sales at $17.50.

Philadelphia, Dec. 31.—Pig iron sales are restricted to small lots of foundry grades. Consumption is unusually good. Many consumers have specified for prompt shipment after the first of the year. Foundry iron is $21, base, eastern Pennsylvania furnace, although $20.50 has not entirely disappeared.

Buffalo, Dec. 31.—Pig iron shipments in the past week exceeded expectations. Specifications for early January delivery are liberal. The market is quiet. Prices are unchanged. Delay in getting steel for reconstruction will defer lighting of an additional Hanna Furnace Co. stack here until about Jan. 15.

Youngstown, O., Dec. 31.—Pig iron trade here of late has been marked largely by steadiness of shipments from furnaces to consumers rather than by new purchases. Some small-lot sales have continued to be made of No. 2 foundry at $18, valley, and of malleable at $18 to $18.25. Youngstown Sheet & Tube Co. Dec. 29 blew in its No. 4 stack at the Campbell works, this replacing its Jeanette stack blown out last week at its Brier Hill works for relining.

Cleveland, Dec. 31.—Pig iron sales in the past week were slightly larger than in the week preceding, 19,000 tons being booked by furnace interests with headquarters in Cleveland. An Indiana melter wants 2000 tons, and various other inquiries now pending total around 3000 tons. December shipments were lower than those of November, owing to inventories. Big demand is in prospect for first quarter. The market continues firm at $19, base, furnace, for local delivery, and $18.50, base, furnace, for outside shipments.

Cincinnati, Dec. 31.—Pig iron orders are light. The Louisville & Nashville railroad is understood to have closed for 450 tons. Prices are firm.

Chicago, Dec. 31.—Pig iron shipments in December were less than 10 per cent under the high rate of November. Some new inquiries have appeared for second quarter. Stocks are extremely low in furnace yards, but a better balance of grades has been obtained. The market is firm at $20, base, Chicago furnace.

Birmingham, Ala., Dec. 31.—Pig iron shipments are active again. Surplus stock of foundry iron is less than a year ago. One or two blast furnaces will be blown in within 30 days. Some sales were made recently at $16.50 base, Birmingham, although two companies held to $17.

Current Rolled Steel Prices

PRICES IN CENTS PER POUND UNLESS OTHERWISE INDICATED
SEE ALSO PRECEDING PAGE

HOOPS, BANDS, STRIPS

Hot strip, to 6-in., Pitts.	1.90c to 2.00c
Hot strip, 6 1/16 to 24-in., Pitts.	1.80c to 1.90c
Hot rolled strip, 12 to 24-inch 16 gage and heavier, coils or cut length, plate basis, or 2.10c blue annealed basis.	1.90c to 2.00c
Hot strip, bands 6 in. and under, Chicago	2.10c to 2.30c
Do, 6½ to 24 in.	2.00c to 2.10c
Cold rolled strip, hard coils, 16 inches and under by 0.100-inch and heavier, base Pitts., Cleve. (3 tons and over)	2.85c to 2.95c
Worcester, Mass. (3 tons and over)	3.10c to 3.20c

ALLOY STEEL

Hot Rolled
F.o.b. Mills

Alloy Quality Bar Base is 2.65c to 2.75c

S.A.E. Series Number	Alloy differential	Net, 100 lb. bars
2000	0.25	$3.00
2100	0.55	3.30
2300	1.50	4.25
2500	2.25	5.00
3100	0.55	3.30
3200	1.35	4.10
3300	3.80	6.55
3400	3.20	5.95
4100 0.15-0.25 Mo.	0.50	3.25
4100 0.25-0.40 Mo.	0.70	3.45
4600 0.20-0.30 Mo. 1.25-1.75 Ni.	1.05	3.80
5100 0.60-0.90 Cr.	0.35	3.10
5100 0.80-1.10 Cr.	0.45	3.20
5100 Chrome Spring	0.20	2.95
6100 Bars	1.20	3.95
6100 Spring Steel	0.95	3.70
Chrome Nickel Vanadium	1.50	4.25
Carbon Vanadium	0.95	3.70
9250 (flats)	0.25	3.00
9250 (rounds, squares)	0.50	3.25

TUBING

Boiler

Carload Discounts—F.o.b. Pittsburgh Mills

Steel 3¼ to 3¾-inch	56
Charcoal iron, 3¼ to 3½-inch	18
Seamless hot rolled 3¼ to 3½-inch	56

Lapwelded steel takes two supplementary 5 per cents for carload lots; charcoal, 10 per cent; seamless, 5 per cent.

COLD DRAWN SEAMLESS

F.o.b. mill in desirable quantities

Random lengths, over 5 feet..... 55 per cent
Selected lengths, 1 to 18 feet..... 53 per cent

WIRE PRODUCTS

F.o.b. Pittsburgh, Cleveland, Ironton base
(Per pound)

	Dealer trade	Large jobbers
Bright plain wire, 6 to 9 gage	2.60c	2.50c
Annealed field wire	2.75c	2.65c
Galvanized wire	3.20c	3.10c
Barbed wire, galvanized	3.40c	3.30c
(Per 100-pound keg)		
Wire nails	$2.75	$2.65
Galvanized nails	4.75	4.65
Polished staples	3.20	3.10
Galvanized staples	3.45	3.35
Cement coated nails	2.75	2.65

Joliet, DeKalb and Waukegan, Ill., Anderson, Ind., and Chicago prices $1 per ton over Pittsburgh-Cleveland-Ironton base on products made there; Duluth $2 higher, Worcester, Mass., and Fairfield, Ala., $3 higher.

Woven wire fencing, retailers, Pittsburgh-Cleveland, net ton $65.

Anderson, Ind., $1 higher, Chicago $2 higher, and Duluth and Birmingham $3 higher.

CUT NAILS, CHAIN, PILING

Cut nails c.l., f.o.b. mills	2.75c
Cut nails, l.c.l. f.o.b. mills	2.85c
Chain, 1-in., proof coil, Pitts.	6.00c
Sheet piling base, Pittsburgh	2.25c

CAST IRON WATER PIPE

Prices per net ton
Class B pipe

Six-inch and over, Birming'm	$37.00 to 38.00
Four-inch, Birmingham	41.00 to 42.00
Four-inch, Chicago	49.20 to 50.20
Six-inch to 24-inch, Chicago	45.20 to 46.20
Four-inch, New York	41.60 to 43.10
Six-inch and over, New York	38.60 to 40.10
Standard fittings, Bir. base	$100.00

Six to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, $5 higher.

Class A pipe is $4 higher than Class B.

IRON AND STEEL PIPE

Base Discounts Pittsburgh and Lorain, O., to Jobbers in Carloads

	Black	Galv.
1 to 3-inch butt steel*	62	50*
1 to 1½-inch butt iron	30	13

Indiana Harbor, Ind., and Evanston, Ill., 2 points less, Chicago, del., 2½ points less.

*To large jobbers these discounts are increased on black by 1 point and a supplementary discount of 5 per cent on galvanized by 1½ points with a supplementary 5 per cent.

RAILS, TRACK MATERIAL

Standard bessemer rails, mills	$43.00
Standard open-h'th rails, mill	$43.00
Relaying rails, St. Louis	$24.00 to 31.00
Relay rails, Pitts. 60 to 90 lb.	$22.00 to 27.00
Light rails, 25 to 45, mills	$36.00
Angle bars, Chicago base	2.75c
Spikes, railroad, Pittsburgh	2.80c
Spikes, small railroad, 7/16-inch and smaller, Pitts.	2.80c
Spikes, boat and barge, Pitts.	3.00c
Spikes, railroad, Chicago	2.80c
Track bolts, Pitts., steam roads	3.80c
Track bolts, Pitts., stand, jobbers	70 off list
Track bolts, Chicago	3.80c
Tie plates, Chicago, Pitts.	$43.00

BOLTS AND NUTS

Birmingham and Chicago

Discounts are for legitimate jobbing or large consuming trade purchasing in full-case lots, apply to lists of April 1, 1927.

Small lots are 55 to 60 per cent off.

CARRIAGE BOLTS

All sizes, cut thread	60 to 70 off

Rolled thread ⅜ x 6 and smaller take 10 per cent lower list.

Eagle list	60 to 70 off

MACHINE BOLTS

All sizes, cut thread	60 to 70 off

Rolled thread ⅜ x 6 and smaller take 10 per cent lower list.

Lag Screws	60 to 70 off
Plow bolts, Nos. 1-2-3-7 heads	60 to 70 off
Tap bolts	60 to 70 off
Blank bolts	60 to 70 off
Stud bolts without nuts	60 to 70 off
Stove bolts, 75, 20, 10 and 5 off in pkgs., 75, 20, 10 and 5 with 2½ off in bulk.	
Tire bolts	60-5 off

Nuts

Semifinished	60 to 70 off

HEXAGON CAP SCREWS

Milled	80-10-10 off
Upset 1 in. diam. and smaller	85-5 off

SQUARE HEAD SET SCREWS

Milled	80-10 off
Upset 1 in. diam. and smaller	80-10-10 off

RIVETS

Struc. c.l., Pitts.-Cleve.	2.80c to 2.90c
Structural, c.l., Chicago	3.00c
**7/16-inch and smaller, Pitts.	70 and 10 off
Chi., Cleve.	70 to 70 and 10 off

**Some makers quoting 70 off with freight allowed on 300 pounds or more.

WASHERS

Wrought, c.l., Pitts. dist.	$6.50 to 6.75 off
Wrought, c.l., Chicago dist.	$6.70 to 6.90 off
Lock: to dealers	85-5 off
Lock: to consumers	85 off

Raw Materials and Semifinished Products

SEMIFINISHED MATERIAL

Prices Per Gross Ton

BILLETS AND BLOOMS
4 x 4-inch base

Pittsburgh, open-hearth	$33.00
Pittsburgh, bessemer	33.00
Youngstown	33.00
Cleveland	34.00
Philadelphia	38.30 to 39.30
Chicago	35.00
Forging, Chicago	40.00
Forging, Pittsburgh	38.00
Forging, Philadelphia	43.30

SHEET BARS

Pittsburgh	$34.00
Youngstown	34.00
Cleveland	34.00
Chicago	35.00

SLABS

Pitts., Young., and Cleve.	$33.00

WIRE RODS

Pittsburgh, Cleveland	$42.00
Chicago	43.00

SKELP

All grades, Pittsburgh	1.85c to 1.90c

IRON ORE

LAKE SUPERIOR ORE
Per Gross Ton, Lower Lake Ports

Old range bessemer, 51½%	$4.55
Mesabi bessemer, 51½%	4.40
Old range nonbessemer 51½%	4.25
Mesabi nonbessemer, 51½%	4.25

EASTERN LOCAL ORES
Cents per unit delivered at Eastern Pennsylvania and New Jersey furnaces

Foundry and basic, 56-63%	8.00
Copper free low phosphorus 58 to 65 per cent	nominal

FOREIGN ORE
Cents per unit, alongside docks, Atlantic ports

Foreign manganiferous ore, 45-55% iron, 6-8% manganese	10.50 to 11.00
North African low phosphorus	10.00 to 11.00
Swedish foundry or basic, 65%	9.00 to 9.50
Spanish and North African basic, 50 to 60 per cent	nominal
Newfoundland foundry, 55%	8.50

MANGANESE ORE

Prices do not include duty of 1 cent per pound of metallic manganese contained.

Brazilian	35 cents
Indian	35 to 36 cents
Caucasian (53-55 per cent)	36 to 38 cents

FLUORSPAR

85 and 5 per cent grade

Washed gravel, Kentucky and Illinois mines, per net ton	$18.00
Washed gravel, imported duty paid, east, tidewater, gross ton	$19.40 to 20.40

REFRACTORIES

FIRE CLAY BRICK
Per 1000 f.o.b. works

First Quality

Pennsylvania	$43.00 to 46.00
Ohio	43.00 to 46.00
Illinois	43.00 to 46.00
Kentucky	43.00 to 46.00
Missouri	43.00 to 46.00
Maryland	43.00 to 46.00
Georgia and Alabama	40.00 to 45.00

Second Quality

Pennsylvania	35.00 to 38.00
Ohio	35.00 to 38.00
Illinois	35.00 to 38.00
Kentucky	35.00 to 38.00
Missouri	35.00 to 38.00
Maryland	35.00 to 38.00
Georgia and Alabama	30.00 to 35.00

SILICA BRICK

Pennsylvania	43.00
Joliet, Ill., East Chicago, Ind.	52.00
Birmingham	50.00 to 51.00

MAGNESITE BRICK
Per Net Ton

9 x 4½ x 2½	65.00

MAGNESITE
Net Ton Chester, Pa., and Baltimore base

Dead-burned grain magnesite	40.00

CHROME BRICK
Net Ton Chester, Pa., and Baltimore base

9 x 4½ x 2½	45.00

Rails, Cars

Cars Pending Augur Well for January Orders—Louisville & Nashville Buys 2450

JANUARY promises to exceed December in car lettings. In latter month approximately 4100 cars were awarded. Illinois Central wants 2760. Chicago & North Western is inquiring for 2000 freight cars. Track fastening inquiry at Chicago 12,000 tons. New York Central awards 100 locomotives.

RAILROAD TRACK PRICES, PAGE 62

New York, Dec. 31.—American mills have booked 1500 tons of tram rails for Osaka, Japan.

Preliminary estimates point to the placing of 44,000 freight cars by domestic lines in 1928, with approximately 4100 definitely recorded so far in December. Lehigh Valley is expected to place 1000 freight cars immediately. Current inquiry includes 1000 gondolas for Chicago & North Western and five diners for Union Pacific.

Export buying of freight cars in 1928 involved at least 1900 to 2000 as against 650 in 1927. Domestic passenger car buying appears to have involved 1315 as against 1300 in 1927. Interurban, subway and other heavy electric car awards involved 130 according to preliminary estimates against 236 in preceding year. Gasoline electric car orders totalled 160 against 130 in 1927 and over 430 street cars were placed in 1928 as compared with 537 the year before. During first 11 months of 1928 car builders made repairs to 3291 freight cars against 5110 in corresponding period of 1927.

Pittsburgh, Dec. 31.—Substantial tonnages of track fastenings are to be purchased early in January by the Erie and the Pennsylvania. The former road also will buy 2400 kegs of spikes soon. Small orders flow steadily.

Chicago, Dec. 31.—Three western roads purchased 10,000 tons of rails. Orders about ready aggregate 50,000 tons, including tonnage for Chicago, St. Paul, Minneapolis & Omaha. Copper interests bought 300 tons of light rails. Several thousand tons of track fastenings were ordered and about 12,000 tons is under inquiry, in addition to the Pennsylvania's 7000 tons.

Illinois Central is inquiring for 2760 freight and passenger cars and 15 switch engines. Chicago & North Western, inquiring for 1000 gondolas, will soon ask bids on 1000 automobile cars. It now has 900 cars on order. Chicago, Burlington & Quincy awarded six locomotives.

CAR ORDERS PLACED

Chicago, Indianapolis & Louisville, 10 cabooses to American Car & Foundry Co.

Lehigh & New England, 200 hopper car repairs to American Car & Foundry Co.

Louisville & Nashville, 2450 miscellaneous freight cars placed as follows: 1200 gondolas to Pressed Steel Car Co., 700 automobile cars and 250 gondolas to Mt. Vernon Car & Mfg. Co., and 300 box cars to Pullman Car & Mfg. Corp.

New York Central, 100 gondolas, to shops of its subsidiary, Merchants' Dispatch Transportation Co.

Reading, three gasoline-electric motor cars, to J. G. Brill Co.

Virginian, 500 hoppers to Virginia Bridge & Iron Works.

LOCOMOTIVE ORDERS PLACED

Chicago, Burlington & Quincy, six freight locomotives to Baldwin Locomotive Works.

Missouri Pacific, 25 switching engines to Lima Locomotive Wors.

New York Central, 100 heavy freight locomotives, to American Locomotive Co. These will cost approximatley $9,000,000.

CAR ORDERS PENDING

Atchison, Topeka & Santa Fe, 14 combination mail and baggage cars.

Chicago & North Western, 2000 cars, including 1000 each gondolas and automobile cars.

Illinois Central, 2760 cars, including 1000 automobile and furniture, 1500 coal, 200 flat, 35 passenger, and 25 caboose cars.

Union Pacific, five diners.

LOCOMOTIVE ORDERS PENDING

Illinois Central, 15 switch engines. Bids to be asked soon.

Pig Iron Prices

Per Gross Ton

Bessemer, valley furnace	$18.25 to 18.50
Bessemer, del. Pittsburgh	20.01 to 20.26
Basic, valley furnace	17.50 to 18.00
Basic, del. Pittsburgh	19.26 to 19.76
Basic, Buffalo furnace	17.50
Basic, del. eastern Pa.	19.75 to 20.00
Malleable, valley furnace	18.00 to 18.50
Malleable, Del. Pittsburgh	19.76 to 20.26
Malleable, del. Cleveland	19.50
Malleable, Chicago furnace	20.00
Malleable, Buffalo furnace	19.00
Malleable, del. eastern Pa.	21.50 to 22.00
Malleable, Granite City fur.	20.50
No. 1 foundry, Chicago furnace	20.50
No. 1X, eastern del., Phila.	22.26 to 22.76
No. 1X, Buffalo furnace	20.00
No. 2 foundry, valley furnace	18.00
No. 2 foundry, del. Pittsburgh	19.76
No. 2 plain, Buffalo furnace	18.50
No. 2 foundry, Chicago furnace	20.00
No. 2 foundry, Granite City	20.00
No. 2 foundry, Ironton furnace	18.50
No. 2 foundry, del. Cleveland	19.50
No. 2 plain, del. Phila.	21.26 to 21.76
No. 2 plain, Virginia furnace	20.75
No. 2 plain eastern Pennsylvania, del. Boston	24.15 to 24.65
No. 2 plain, N. J., tidewater	20.78 to 21.28
No. 2 Alabama, Birmingham	16.50 to 17.00
No. 2 Alabama, del. Cincinnati	20.19 to 20.69
No. 2 Tenn., Birmingham base	16.50
No. 2 Tenn., del. Cincinnati	20.19
No. 2 Alabama, del. Chicago	22.51 to 23.01
No. 2 Alabama, del. Cleveland	22.76 to 23.26
No. 2 Alabama, del. St. Louis	21.42
No. 2X, east, N. J., tidewater	21.28 to 21.78
No. 2X, eastern, del. Phila.	21.76 to 22.26
No. 2X, foundry, Buffalo furnace	19.00
No. 2X, eastern, del. Boston	24.65 to 25.15
No. 2X, Virginia furnace	21.25
Gray forge, val., del. Pittsburgh	19.26
Low phos., standard, valley	27.00
Low phos., standard, Phila.	24.26 to 24.76
Low phos., copper bearing fur.	23.00 to 23.50
Charcoal, Birmingham	28.00
Charcoal, Superior, del., Chicago	27.04

CANADIAN PRICES

No. 2 foundry, del. Toronto	23.60
No. 2 foundry, del. Montreal	25.00
Malleable, del. Toronto	23.60
Malleable, del. Montreal	25.00
Basic, del. Montreal	24.00

Silvery iron, Jackson county, O., furnaces, in per cents: 5—$23 to $24; 7—$25 to $26; 8—$26 to $27; 9—$27 to $28; 10—$29 to $30; 11—$31 to $32; 12—$33 to $34; 13—$35 to $36.

Bessemer ferrosilicon, Jackson county, O., furnaces, in per cents: 10—$31 to $32; 11—$33 to $34; 12—$35 to $36; 13—$37 to $38; 15—$41.50 to $42.50; 16—$43 to $44.

Wire

New Prices for First Quarter Are Applied on Contracts

WIRE PRICES, PAGE 62

Worcester, Mass., Dec. 31.—Slight resistance to new prices for first quarter wire requirements has been met in the few orders booked. Specifications against last quarter contracts were heavy, resulting in heavier stocks in consumers' hands. This tends to delay a real test on the new quotations. New business on plain wire is 2.75c, Worcester base, to dealers.

Pittsburgh, Dec. 31.—Resistance to the $2 advance on wire and nails has not been up to expectations and the market is $2.75, Pittsburgh, to the trade in general on wire nails, and 2.60c, Pittsburgh, for 6 to 9-gage bright plain wire. Contracting at the new prices is at a satisfactory rate. Specifications continue heavy although shipments are not so active.

Buffalo, Dec. 31.—Indications are that wireworks will book unusually large tonnages of cloth and netting for winter delivery, owing to light jobbers' stocks.

Foreign News

British Outlook Promising—Ruhr Steelworkers' Demands Cut Down

London, Dec. 31.—(By Radio)—Although British iron and steel markets are quiet, the end of the year has brought some hopeful signs. Imports are decreasing and production is increasing. Continental prices are higher. The full effects of the British freight rate reduction plan are yet to be realized, though a start has been made with the reduction. Substantial orders for rolling stock for delivery to Siam have been placed in Birmingham and Sheffield. A report from Berlin states the arbitrator in the Ruhr steelworks labor dispute has awarded employes an increase in wages and reduction in hours, but not as much as they demanded. Belgian and French markets are quiet, and prices firm.

The Market Section

Coke

Market Steady, Despite Surplus of Beehive—By-Product Fuel Moves Steadily

CONNELLSVILLE furnace coke continues $2.75, although there is a surplus. Producers look for a better market in the first quarter. The majority of consumers, however, have covered requirements for that period. Prices of by-product foundry coke generally carry over into the New Year.

Pittsburgh, Dec. 31.—Little activity was noted in coke the past week. Only small lots were placed. Furnace coke is firm at $2.75. Practically all first quarter requirements have been covered. There is a surplus of coke but producers' position is strengthened by the bright outlook for first quarter in the steel industry. Foundry coke is unchanged at $3.75 to $4.85.

New York, Dec. 31.—Coke specifications show a reduction, due to inventory, but consumption continues good. Prices are steady.

Cincinnati, Dec. 31.—Prices of by-product foundry coke are unchanged for January, and no change is reported in beehive. Prices of by-product domestic coke have been advanced 50 cents. Coke shipments have slowed down for inventory.

Birmingham, Ala., Dec. 31.—Coke production is steady, and consumption by foundries is fairly good. By-product foundry coke is firm at $5, base, Birmingham.

Semifinished

Specifications Active—First Quarter Outlook Good

SEMIFINISHED STEEL PRICES, PAGE 62

Cleveland, Dec. 31.—Specifications for sheet bars, billets and slabs continue active, the leading local merchant producer operating at 100 per cent. A good, active demand is anticipated throughout the first quarter. Prices are steady.

Youngstown, O., Dec. 31.—Practically all old customer-users of billets and sheet bars have covered for first quarter needs as well as they could. Producing mills have use for all their semifinished steel in their own works. Sheet bars are firm at $34, Pittsburgh and Youngstown, as are billets and slabs at $33, same bases. Wire rods are $42, Pittsburgh and Cleveland.

Coke Prices

Prices per Net Ton

Beehive Ovens	
Connellsville furnace	$2.75
Connellsville foundry	3.75 to 4.85
New River foundry	6.50 to 7.00
New River furnace	6.50
Wise county foundry	4.50 to 5.25
Wise county furnace	3.75 to 4.75
By-Product Foundry	
Newark, N. J., del.	9.00 to 9.40
Chicago, ovens	8.00
New England, del.	11.00
St. Louis, del.	9.00
Birmingham	5.00
Indianapolis, del.	8.25
Ashland, Ky.	7.00
Portsmouth, O.	7.00
Detroit, ovens	8.50
Buffalo, ovens	9.00

Ferroalloys

Uniformly Steady Rate of Bookings Expected in 1929

New York, Dec. 31.—Ferromanganese is closing the year without the excited condition of a year ago when consumers were overspecifying to take advantage of low prices. With $105, duty paid, tidewater, for ferromanganese extended through all of 1929, there is no incentive to overspecifying and producers expect a uniformly good rate of bookings. Spiegeleisen demand is good. Carload lots are $34, base, furnace, while usual differentials are allowed on quantities.

Pittsburgh, Dec. 31.—Ferromanganese continues firm at $109.79, delivered, Pittsburgh. Shipments continue at a high rate. Ferrosilicon is unchanged at $83.50. Spiegeleisen is steady at $34 in lots up to 100 tons but most consumers are understood to have covered their needs at $33 prior to the recent advance. Spot business commands $34.

Chicago, Dec. 31.—Specifications and shipments of practically all ferroalloys in 1928 were 15 to 20 per cent ahead of 1927. Ferromanganese is unchanged at $105, seaboard, or $112.56, delivered Chicago. The price of 50 per cent ferrosilicon is $83.50 to $88.50. Carload lots of spiegeleisen are quoted at $34, eastern furnace, for 19 to 21 per cent, with differentials for tonnage orders. Some tonnage business was closed in this district directly by an eastern furnace.

Fluorspar

Foreign Material Brings $20.40, Duty Paid—Some for West

New York, Dec. 31.—Thirty-five hundred tons of foreign fluorspar has been sold for shipment over all 1929 at $12, c.i.f. per gross ton, or $20.40, duty paid, for the metallurgical grade. An interesting feature is that some of this spar is for shipment farther west than usual even before the recent 50 per cent rise in the duty.

Bolts, Nuts, Rivets

First Quarter Contracts Well Covered —Specifications Lighter

NUT AND BOLT PRICES, PAGE 62

Pittsburgh, Dec. 31.—Contracts for first quarter nuts and bolts are coming in rapidly and some producers report most customers have covered. Specifications are seasonally lighter and an increase is expected soon. Practically no change in the operating rate is reported, most interests holding around 60 to 65 per cent. Prices are unchanged with bolts and nuts 60 to 70 off and large rivets 2.90c, Pittsburgh.

Chicago, Dec. 31.—A slight increase is shown in specifications for bolts, nuts and rivets from automotive industry. First quarter contracting is completed. Specifications are largely from contract buyers and spot buying is light. Operations are 65 to 70 per cent. Bolts and nuts are steady at 60 to 70 off.

Cleveland, Dec. 31.—While nut, bolt and rivet specifications were light the first half of the month, the last half has shown a surprising pickup. Most specifications are for immediate shipment.

Chicago Steel Rate Gains

Chicago, Dec. 31.—Due to the stepping-up of rail mill operations to about 80 per cent, steelworks operations in the Chicago district have advanced a few points and now are between 80 and 85 per cent of the district's ingot rate. Bar mill operations are slightly above 85 per cent. Twenty-four of the 36 steelworks blast furnaces in the district are active.

Ferroalloy Prices

Ferromanganese, 78 to 82 per cent tidewater duty paid	$105.00
Ferromanganese, del. Pittsburgh	$109.79
Spiegeleisen, 19 to 21 per cent domestic furnace, spot†	34.00
*Ferrosilicon, 50 per cent, freight allowed, carloads	83.50
*Do., less carload	88.50
Do., 75 per cent	130.00 to 150.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. per lb. con., del.	11.00
Do., for spot delivery	11.50
Ferrotungsten, stand., lb. cont.	1.00 to 1.03
Ferrovanadium, 30-40 per cent, per lb., contained, on analysis	3.15 to 3.65
Ferro-carbon-titanium carload, producers plant, net ton	200.00
Ferrophosphorus, per ton, carload, 17 to 19 per cent, Rockdale, Tenn., basis (18 per cent)	91.00
Ferrophosphorus, electrolytic, per ton, carload, 23-25% f.o.b. Anniston, Ala. (24 per cent)	122.50

†Quantity diff. apply on 100 tons and over.
*These prices contract, spot $5 higher.

Scrap

Shortage Strengthens Prices and Dealers Sell Little Ahead— Market Is Quiet—Steel Is Strong

SMALL supplies of iron and steel scrap are coming out and scarcity is being felt by dealers and consumers. Prices are potentially higher, but in absence of actual buying are not clearly defined. Brokers are unwilling to sell for future delivery and in some cases find difficulty making deliveries.

Chicago, Dec. 31.—All grades of iron and steel scrap are strong and in good demand except gray iron foundry grades. Carlot sales of angle bars are being made as high as $16.75. Railroad malleable is in strong demand and tonnages are scarce. Advances of 50 cents have been made in railroad and agricultural malleable. Rerolling rails are up 50 cents and low phos punchings 25 cents. Heavy melting steel continues strong at $14.50 to $15. Larger buyers of melting steel are out of the market temporarily. Most grades are not being offered in sufficient quantities to meet demand.

New York, Dec. 31.—Buying by Pittsburgh dealers here has advanced market on yard steel to $9.50 to $10.50. Railroad scrap is slightly stronger at $12.50. Other scrap prices are unchanged with little fresh consuming demand noted following substantial purchases of last week.

Philadelphia, Dec. 31.—Scrap reflects a firm tone manifested last week when two eastern mills bought No. 1

Iron and Steel Scrap Prices

Corrected to Tuesday noon. Gross tons delivered to consumers, except Detroit where dealers' buying prices are shown

Steel Works Scrap

HEAVY MELTING STEEL

Birmingham	$11.50 to 12.50
Boston, dealers	11.00 to 11.50
Boston, No. 2	10.00 to 10.50
Buffalo, No. 1	16.00 to 16.50
Buffalo, No. 2	13.75 to 14.25
Chicago	14.50 to 15.00
Cincinnati, deal	13.25 to 13.75
Cleveland, No. 1	14.75 to 15.25
Cleveland, No. 2	14.25 to 14.75
Detroit, No. 1	13.50 to 14.00
Detroit, No. 2	11.00 to 11.50
East Pa., del. mill	15.00 to 16.50
East. Pa., deal. del.	14.50 to 16.00
N. Y., deal., R. R.	11.50 to 12.00
N. Y., deal., yd.	8.00 to 8.50
Pittsburgh, No. 1	18.50 to 19.00
St. Louis, No. 1	13.25 to 13.75
St. Louis, No. 2	12.50 to 13.00
Valleys, No. 1	17.00 to 17.50

COMPRESSED SHEETS

Buffalo	15.00 to 16.00
Chicago	13.00 to 13.50
Cleveland	14.50 to 15.00
Detroit	13.50 to 14.00
Pittsburgh	18.50 to 19.00
Valleys	17.00 to 17.50
E. Pa. new mat	13.00 to 13.50

BUNDLED SHEETS

Buffalo	11.75 to 12.25
Cincinnati, deal	10.50 to 11.00
Cleveland	12.00 to 12.25
Eastern Pa.	11.00 to 11.50
Pittsburgh	16.00 to 16.50
St. Louis	8.50 to 9.00

SHEET CLIPPINGS LOOSE

Chicago	7.50 to 8.00
Cincinnati	9.50 to 10.00
Detroit	8.50 to 9.00
St. Louis	8.50 to 9.00

STEEL RAILS, SHORT

Birmingham	12.00 to 13.00
Boston	8.25 to 8.75
Buffalo	17.75 to 18.00
Chicago	17.00 to 17.50
Cincinnati, deal.	19.00 to 19.50
Detroit	17.00 to 17.50
St. Louis	17.50 to 18.00

STOVE PLATE

Birmingham	13.00 to 13.50
Boston consumers	11.00 to 11.50
Buffalo	14.50
Chicago, net	12.25 to 12.75
Cinn., deal., net	9.50 to 10.00
Cleveland	10.00 to 11.00
Detroit, net	9.50 to 10.00
Eastern Pa.	12.00 to 12.50
N. Y., deal., mill	8.25 to 8.75
Pittsburgh	12.00 to 12.50
St. Louis	12.25 to 12.75

SHOVELING STEEL

Chicago	14.50 to 15.00
Pittsburgh	17.50 to 18.00
St. Louis	13.25 to 13.75

KNUCKLES COUPLERS SPRINGS

Buffalo	17.75 to 18.25
Chicago	16.25 to 16.75
Eastern Pa.	17.00 to 17.50
Pittsburgh	19.00 to 19.50
St. Louis	15.00 to 15.50

LOW PHOSPHORUS

Buffalo, billet and bloom crops	17.75 to 18.25
Cincinnati, deal	15.00 to 15.50
Eastern Pa.	19.00 to 20.50
Pitts. billet and bloom crops	21.00 to 21.50
Cleve. billet and bloom crops	17.00 to 17.50

FROGS, SWITCHES, GUARDS

Chicago	15.75 to 16.25
St. Louis	15.00 to 15.50

ANGLE BARS—STEEL

Chicago	16.00 to 16.50
St. Louis	14.25 to 14.75

Iron Mill Scrap

RAILROAD WROUGHT

Birmingham	9.50 to 10.50
Boston, dealers	11.50 to 12.00
Buffalo, No. 1	13.00 to 13.50
Buffalo, No. 2	15.50 to 16.00
Chicago, No. 1	14.50 to 15.10
Chicago, No. 2	14.50 to 15.00
Cinn., No. 2	13.25 to 13.75
Eastern Pa.	15.00 to 16.00
N. Y., No. 1 deal.	11.00 to 11.50
Pittsburgh, No. 1	14.00 to 14.25
Pittsburgh, No. 2	17.50 to 18.00
St. Louis, No. 1	13.00 to 13.50
St. Louis, No. 2	13.25 to 13.75

WROUGHT PIPE

Boston, dealers	9.50 to 10.00
Eastern Pa.	14.50 to 15.00
Boston	9.00 to 9.50
New York, deal	10.25 to 10.75

YARD WROUGHT

Boston	9.00 to 9.50
Eastern Pa.	15.00 to 15.50

BUSHELING

Buffalo	15.00 to 16.00
Chicago, No. 1	13.00 to 13.50
Chicago, No. 2	8.50 to 9.00
Cinn., No. 1 deal.	11.00 to 11.50
Cinn., No. 2	7.00 to 7.50
Cleveland, No. 1	12.25 to 12.50
Cleveland, No. 2	11.25 to 11.50
Detroit, No. 1	12.50 to 12.75
Detroit, mixed	7.50 to 8.00
Pittsburgh, No. 1	14.50 to 15.00
St. Louis, No. 1	10.00 to 10.50

MACHINE SHOP TURNINGS

Birmingham	9.00 to 9.50
Boston	6.25 to 6.50
Buffalo	7.50 to 8.00
Chicago	8.00 to 8.50
Cincinnati, deal	9.50 to 10.00
Cleveland	9.75 to 10.25
Detroit	8.25 to 8.50
Eastern Pa.	11.00 to 11.50
New York, deal	7.00 to 7.50
Pittsburgh	12.50 to 13.00
St. Louis	9.00 to 9.50

MIXED BORINGS, TURNINGS
For blast furnace use

Boston, dealers	5.75 to 6.00
Buffalo	11.50
Cincinnati, deal	10.00 to 10.50
Cleveland	11.25 to 11.75
Detroit	9.25 to 9.50
Eastern Pa.	9.50 to 11.00
New York, deal	6.25 to 7.00
Pittsburgh	12.00 to 12.25

CAST IRON BORINGS

Birmingham, chem.	13.00 to 13.50
Birmingham, plain	9.00 to 9.50
Boston, chem.	10.00 to 10.25
Boston, dealers	5.75 to 6.50
Buffalo	11.50
Chicago	12.00 to 12.25
Cincinnati, deal	10.00 to 10.50
Cleveland	11.25 to 11.50
Detroit	9.25 to 9.50
Eastern Pa.	11.00 to 11.50
Eastern Pa., chem.	14.50 to 15.00
New York, deal	6.75 to 7.00
Pittsburgh	12.00 to 12.50
St. Louis	9.50 to 10.00
Valleys	12.50 to 13.00

PIPE AND FLUES

Chicago, net	9.75 to 10.25
Cincinnati, deal	8.50 to 9.00

RAILROAD GRATE BARS

Buffalo	12.50 to 13.00
Chicago, net	12.50 to 13.00
Cincinnati	10.00 to 10.50
Eastern Pa.	12.00 to 12.50
New York, deal	9.25 to 9.75
St. Louis	11.00 to 11.50

FORGE FLASHINGS

Boston, dealers	9.00 to 9.25
Buffalo	13.00 to 13.50
Chicago	9.50 to 10.00
Cleve., over 10 in.	12.25 to 12.75
Detroit	11.50 to 12.00
Pittsburgh (light)	15.00 to 15.50

FORGE SCRAP

Boston, dealers	7.25 to 7.50
Chicago	16.50 to 17.00
Eastern Pa.	12.00 to 13.00

ARCH BARS AND TRANSOMS

Chicago, net	21.00 to 21.50
St. Louis	22.00 to 22.50

Iron, Steel Works Scrap

AXLE TURNINGS

Boston, deal	6.75 to 7.00
Buffalo	13.50 to 14.00
Chicago	11.75 to 12.25
Cleveland	12.50 to 13.00
Eastern Pa.	12.00 to 13.00
Pittsburgh	16.00 to 16.50
St. Louis	11.50 to 12.00

STEEL CAR AXLES

Birmingham	16.00 to 17.00
Boston, ship point	16.00 to 16.50
Buffalo	18.25 to 18.75
Chicago	18.00 to 18.50
Cleveland	19.50 to 20.00
Eastern Pa.	22.00
Pittsburgh	21.00 to 21.50
St. Louis	19.50 to 20.00

SHAFTING

Boston, ship point	13.00 to 13.50
Chicago	17.35 to 17.90
Eastern Pa.	19.00 to 20.00
New York, deal	15.00 to 15.50
St. Louis	18.00 to 18.50

Iron Foundry Scrap

CAR WHEELS

Birmingham, iron	12.00 to 13.00
Boston, con.	14.00 to 14.50
Buffalo, iron	13.00 to 13.50
Buffalo, steel	17.00 to 17.50
Chicago, iron	14.00 to 14.50
Chi., rolled steel	17.75 to 18.25
Cincinnati	12.50 to 13.00
Eastern Pa., cast	16.50 to 17.00
Eastern Pa., rolled	17.00 to 17.50
N. Y., iron, deal	12.00 to 12.50
Pittsburgh, iron	15.50 to 16.00
Pittsburgh, steel	19.00 to 19.50
St. Louis, iron	14.50 to 15.00
St. Louis, steel	16.25 to 16.50

No. 1 CAST SCRAP

Birmingham, cup.	14.50 to 15.50
Buffalo	15.00 to 15.50
Boston, textile	15.00 to 15.50
Chicago, mach.	17.35 to 17.90
Chicago, railroad	16.25 to 16.80
Chicago, agri.	15.70 to 16.25
Cincinnati, mach. cupolas, net deal.	16.00 to 16.50
Cleveland, cupola	16.00 to 16.50
Detroit, net	13.50 to 14.00
Eastern Pa. cupola	16.50 to 17.00
N. Y., cup., deal.	13.00 to 13.50
N. Y., del. local foundries	16.50 to 17.00
Pittsburgh, cupola	15.00 to 15.25
San Fran., del	13.50 to 14.00
Seattle	16.00 to 16.25
St. Louis, mach.	15.00 to 15.50
St. Louis	14.00 to 14.50
Valleys	16.50 to 17.00

HEAVY CAST

Boston	10.50 to 11.00
Buffalo, breakable	12.50 to 13.00
Cleve., breakable	12.50 to 12.75
Detroit, auto., net	19.00 to 19.50
Detroit, breakable	9.00 to 9.50
Eastern Pa.	16.00
New York, deal	12.50 to 13.00
Pittsburgh	13.00

MALLEABLE

Boston, railroad	15.75
Buffalo	15.75 to 16.25
Chicago, agri.	13.50 to 14.00
Chicago, railroad	17.75 to 18.25
Cinn., R. R., deal	15.00 to 15.50
Cinn., agri., deal	14.00 to 14.50
Cleveland, agri.	15.00 to 15.50
Cleveland, rail	16.00 to 16.50
Detroit, auto	14.00 to 14.50
Pittsburgh, rail	15.00 to 15.50
St. Louis, rail	15.00 to 15.50

Miscellaneous Scrap

RAILS FOR ROLLING
5 feet and over

Birmingham	13.00 to 14.00
Boston, dealers	11.00 to 11.50
Rails scrap, Boston	11.50 to 12.00
Skelston, Boston	9.00 to 9.25
Buffalo	15.50 to 16.00
Chicago	17.00 to 17.50
Eastern Pa.	15.00 to 15.50
New York	11.50 to 12.00
Pittsburgh district	18.50 to 19.00
St. Louis	15.50 to 16.00

LOCOMOTIVE TIRES

Chicago, No. 1	15.00 to 15.50
Chicago, cut	17.50 to 18.00
St. Louis, No. 1	14.00 to 14.50

LOW PHOS. PUNCHINGS

Chicago	17.00 to 17.50
Pittsburgh	20.00

melting steel at $16 and $16.50.

Buffalo, Dec. 31.—Reports are current there that dealers are unable to deliver heavy melting steel recently purchased by steelworks, but that buyers will utilize stocks and await a turn of the market rather than force dealers to buy in a strong market at a loss. Several small lots of No. 1 heavy melting steel have been sold at $16.50.

Cleveland, Dec. 31.—The holiday period finds scrap dealers inactive with no consumer or dealer purchases. Strength is imparted to the local and Youngstown, O., price situations by fresh sales at Pittsburgh.

Cincinnati, Dec. 31.—Little scrap is moving as consumers are shut down to a considerable extent.

Pittsburgh, Dec. 31.—The iron and steel scrap market here is firm. Dealers appear to be having considerable difficulty in accumulating steelworks grades and the market on these items is stiffening markedly. It is doubtful if heavy melting steel can be bought under $18.50, with $19 more generally recognized as the going market.

Detroit, Dec. 31.—Increased consumer buying of scrap is expected early in January. Prices are up 25 cents to $1 per ton, superseding quotations listed on page 65. No. 1 heavy melting advances to $14.25 to $14.75; compressed sheets to $14 to $14.25; loose sheet clippings, $9 to $9.25; No.1 busheling, $13 to $13.25; cast iron borings and mixed borings and turnings, $9.75 to $10; forge flashings $12.25 to $12.75 and heavy breakable cast, $10 to $10.50. No. 1 machinery cast is the one weak item, declining 50 cents to $13 to $13.50.

Birmingham, Ala., Dec. 31.—Market is somewhat firmer and sales have been made recently which call for considerable tonnage.

Strip Steel

Prices Are Steady and Many Consumers Have Contracted

STRIP PRICES, PAGE 62

Pittsburgh, Dec. 31.—Some seasonal letdown in hot-rolled strip demand is reported here but specifications are better than usual. Larger releases are expected from automotive buyers shortly. Producers look for an active first quarter and report a fair number of contracts at 1.90c to 2.00c, Pittsburgh, for sizes up to 6 inches, and 1.80c to 1.90c, Pittsburgh, for 6 1/16 to 24 inches.

Cold-rolled strip is 2.85c to 2.95c, Pittsburgh. Contracting for first quarter is fairly active. Shipments are not as active as some time ago but the recession is not as marked as usual for this season.

Chicago, Dec. 31.—Several hot strip mills were closed the last week in December for repairs and operations were resumed at about 70 per cent. Mills are well booked on hot strip for most of January. Attractive tonnages have been placed at 1.90c to 2.00c, Chicago, for 6 1/16 to 24 inches, but quotations to miscellaneous buyers for wider strips are 2.00c to 2.10c, Chicago. Cold-rolled strip prices hold steadily at 2.85c to 2.95c, Pittsburgh-Cleveland, for 3 tons and over. Operations are about 70 per cent.

Cleveland, Dec. 31.—Despite active specifying up to Dec. 15 on fourth quarter cold strip contracts, customers are proceeding to furnish shipping instructions upon first quarter arrangements at 2.85c, Pittsburgh-Cleveland. Hot strip orders lately have fallen off but resumption is expected Jan. 2 and thereafter at 1.80c to 1.90c, Pittsburgh, for wide and 1.90c to 2.00c for narrow.

Sheets

Motorcar Industry Taking Fairly Large Tonnages—Deliveries at Chicago Easier

MOTORCAR builders are anticipating their sheet requirements, and deliveries to them are holding up. Mills are gradually working out specifications on fourth quarter contracts. Deliveries from Chicago mills are reported easier than at any time in six months. More contracting is noted in the East.

SHEET PRICES, PAGE 61

Pittsburgh, Dec. 31.—Automotive specifications for sheets are picking up, users anticipating January and February requirements earlier than usual. A steady flow of small orders is received. Prices are firm. The outlook for first quarter is said to be exceptionally bright.

New York, Dec. 31.—Consumers are placing first quarter sheet contracts and jobbers are likely to do some buying this week. Prices are unchanged.

Philadelphia, Dec. 31.—Jobbers are postponing action on first quarter sheets, but consumers are placing good size orders for black at 2.85c, base, Pittsburgh, and galvanized at 3.60c. Little new business is noted in blue annealed sheets, which continue 2.10c. Strip sheets in blue annealed grades are around 2.00c.

Youngstown, O., Dec. 31.—Such sheet mills in the valleys as were down for badly-needed repairs the past week were to resume in full Tuesday night. The others are continuing right after New Year holiday. Specifications are heavy, since every buyer has made it a point to file against year-end shipments, after which the new advanced prices will take effect. Order books of makers of autobody and common grades are comfortably filled for first quarter, which promises to be a production record-breaker.

Cleveland, Dec. 31.—Considerable progress has been made by users of autobody, metal furniture and other highly finished sheets on first quarter contracts. Mills gradually are working out of specifications on other grades received prior to Dec. 15, to close out fourth quarter.

Chicago, Dec. 31.—Deliveries of sheets are easier than for six months, owing to seasonal declines in consumptive lines. Indications are deliveries will tighten shortly. Several mills in the district were down for repairs the last week in December. Chicago delivered prices are steady at 3.00c for No. 24 black, 3.75c for No. 24 galvanized, and 2.25c for No. 10 blue annealed.

Bar Iron Wages Advanced Pig Iron Prices

Bar iron prices in November and December averaged 2.00c per pound, and advance from 1.95c in the preceding two months, according to S. C. Leonard, representing the Western Bar Iron association at a meeting with representatives of the Amalgamated Association of Iron, Steel and Tin Workers. Bar iron mill wages will be increased correspondingly in January and February. Puddlers will receive $11.80 a ton, a raise of 25 cents a ton. Following is a comparison of sales prices on which wages have been based:

	1928	1927	1926	1925	1924
Jan.-Feb.	1.85c	1.95c	2.00c	2.00c	2.35c
Mar.-Apr.	1.85c	1.95c	2.05c	2.35c	2.35c
May-June	1.90c	1.95c	2.00c	2.05c	2.25c
July-Aug.	1.90c	1.95c	2.00c	1.95c	2.15c
Sept.-Oct.	1.95c	1.90c	2.00c	1.95c	2.10c
Nov.-Dec.	2.00c	1.85c	2.00c	1.95c	2.05c
Yearly av.	1.90c	1.90c	2.00c	1.99c	2.21c

Tin Plate

Specifications Heavy — Market Quiet —Prices Firm

TIN PLATE PRICES, PAGE 61

Pittsburgh, Dec. 31.—Specifications on tin plate contracts are heavy. New business is small, as most consumers have covered first half requirements. Production continues at a high rate. The price is firm at $5.35 per 100-pound box, Pittsburgh.

New York, Dec. 31.—Nippon Oil Co., Japan, has placed with American mills orders for 45,000 to 50,000 boxes of tin plate for first quarter shipment to Japan. Three Japanese merchant firms here distributed the business.

The Market Section

Bars

Active Buying Into New Year Is Forecast—Present Bookings Are Heavy—Prices Are Firm

MILLS have heavy backlogs of bars, which are being specified in steady tonnage. First quarter covering is well under way. Deliveries in some cases are six weeks delayed. Prices show strength. Alloy bar mills have had some substantial orders. December specifications have exceeded November.

BAR PRICES, PAGE 61

Chicago, Dec. 31.—Bar mill operations are above 85 per cent and deliveries are four to six weeks. Heavy demand for shipments was made at the close of the year. Estimates of contracts just closed for first quarter are 35,000 to 45,000 tons and contracts pending the last week in December were close to that figure. Demand is strong from implement and tractor manufacturers and drop forgers. Automotive specifications showed a moderate increase. Several heavy lots of specifications for alloy steel bars were placed by automotive interests. Several good first quarter contracts also were booked by alloy steel bar mills. Specifications for all classes of bars during December made a slight gain over November. Soft steel bars are quoted at 2.10c to miscellaneous buyers and 2.00c for larger contract orders.

Pittsburgh, Dec. 31.—First quarter steel bar contracts are being booked steadily at 1.90c to 2.00c, Pittsburgh. Buying is expected to continue actively well into next year, although the seasonal slack in business generally is being reflected in lessened demand. Some automotive specifications for cold-finished bars for January delivery have been received.

Philadelphia, Dec. 31.—Steel bar specifications are considerably off as usual at this time of year, but mills report considerable tonnage already has been specified for first quarter.

Cold Finished Steel

Demand for Shipment Surprisingly High for Season

COLD FINISHED PRICES, PAGE 61

Cleveland, Dec. 31.—Automotive parts makers are maintaining a steady call for cold finished bars. Tonnage is surprisingly high for this season. The 2.25c, Cleveland, price is firm.

Pipe

Cast Grades Active—Steel Pipe Checked by Inventories

PIPE PRICES, PAGE 62

Cleveland, Dec. 31.—Jobber buying of merchant pipe has been purposely curtailed for inventories. Makers expect a resumption of buying early in January.

The Standard Oil Co. of Ohio, which concluded the purchase of a refinery near Cincinnati, will connect it with its western fields by a 105-mile pipe line, probably of 10 or 12-inch.

New York, Dec. 31.—Cast pipe demand is quiet. Bids open today on 250 tons 6 to 24-inch class B.

Pittsburgh, Dec. 31.—Aggregate steel pipe tonnage is above seasonal normal. Several pipe line projects are a step nearer closing, including 150 miles of 20-inch and 50 miles of 16-inch for Pacific Gas & Electric Co. and 500 miles of 22-inch for a Standard Oil subsidiary.

Chicago, Dec. 31.—Several private purchases of 1000 to 3000 tons of cast iron pressure pipe, aggregating about 10,000 tons were recorded here. Detroit has not purchased its 5700 tons of 24 to 48-inch. Milwaukee received bids on 9000 tons of 6 to 16-inch and 450 tons of fittings and offsets.

New York, Dec. 31.—Tokio Gas Co. has placed 5,000,000 feet, or about 5000 tons, of black or galvanized, butt-weld gas pipe, with Japanese mills for delivery over first half of 1929.

Birmingham, Ala., Dec. 31.—Pressure pipe lettings, although few, have encouraged makers, Southwestern and Middlewestern tonnage witnessing growth. Prices continue $37 to $38, base, for 6-inch and larger.

CONTRACTS PLACED

10,000 tons, miscellaneous orders of 6 to 24-inch pipe for the Chicago district, to several producers.

CONTRACTS PENDING

995 tons, 4 to 24-inch class B and C, Bellingham, Wash.; Bids Jan. 3.

657 tons, 12-inch class B or C, East Palo Alto water works district, Redwood City, Calif. Bids, Feb. 6.

324 tons, 6-inch class B and C, San Diego, Calif., United States Cast Iron Pipe & Foundry Co., low bidder.

250 tons, 6 to 24-inch class B, New York. Bids opened Dec. 31.

Plates

More Consumers Contracting for First Quarter—Market Is Quiet—Car Builders Take More

IMPROVEMENT in plate business is expected early in the first quarter. Consumers are contracting at 1.90c to 2.00c, base, Pittsburgh. Builders of oil storage tanks in Chicago purchased about 2000 tons in the past week. Specifications from car building shops are heavier, amounting to 4000 to 5000 tons last week.

PLATE PRICES, PAGE 61

New York, Dec. 31.—Plate demand is unusually good. Miscellaneous consumers are active, and oil companies are buying considerable steel for still bottoms and tanks. The price is 2.00c to 2.10c, base, Coatesville. The contract for the Wanaque pipe line in New Jersey has been awarded T. A. Gillespie & Co., New York, and 35,000 tons of plates will be supplied by Carnegie Steel Co.

Philadelphia, Dec. 31.—Plate demand is light, though first quarter prospects are good. Mills do not expect immediate action on a large amount of shipbuilding tonnage pending. Prices are steady.

Pittsburgh, Dec. 31.—First quarter plate contracting is under way at 1.90c to 2.00c, base, Pittsburgh. Producers look for a large volume of business after the first of the year.

Chicago, Dec. 31.—Plate orders from builders of oil storage tanks totaled about 2000 tons in the past week. Increased tonnage is being distributed for recent welded pipe orders. Deliveries have been extended three to four weeks for plates. Specifications from car building shops are spurting, total for the last week in December having been 4000 to 5000 tons. Contract sales to the car shops totaled about the same. The price is steady at 2.00c to 2.10c, Chicago, except for the usual differentials for southwestern oil tankage.

CONTRACTS PLACED

250 tons, steel tank, Marin Municipal Water District, San Rafael, Calif., to Steel Tank & Pipe Co.

140 tons, one 60,000-barrel tank, Shell Oil Co., Oakland, Calif., to Western Pipe & Steel Co.

Shapes

Many Jobs Scheduled for Release in January—Few Large Jobs Let—Subway Awards Soon

PROSPECTS for structural lettings in January and throughout first quarter are particularly bright, if closing days of December furnish any criterion. Lettings include an 8000-ton building at Chicago. General contract was let for 34,050-ton subway job in East. Plain material prices are firm.

STRUCTURAL SHAPE PRICES, PAGE 61

Pittsburgh, Dec. 31.—Small lot business alone is encountered in structural shapes. Marked improvement is expected during first quarter. The market is firm at 1.90c to 2.00c, Pittsburgh. Norfolk & Western railroad closes bids Jan. 2 on a 2500-ton lot of shapes, plates and bars.

New York, Dec. 31.—Structural demand is exceptionally light, although an early pickup is expected. Work scheduled for first quarter letting is heavy. Shapes are steady at 2.145c to 2.195c, New York.

Philadelphia, Dec. 31.—While shape business dropped perceptibly due to holiday influence, a large amount of tonnage is in sight, indicating a good first quarter.

Cleveland, Dec. 31.—Since the 7000-ton hangar job at Akron, O., was let late this month, shape awards have been confined to smaller lots. The largest is 1500 tons for a plate glass plant near Toledo, O. Contracting for first quarter is largely complete at 1.90c to 1.95c, Pittsburgh, with some small lots going at 2.00c. Mills report fair specifications.

Chicago, Dec. 31.—Specifications from fabricators, well covered for two months ahead, are fair. An 8000-ton award features the market. A 3000-ton job, with several others, is pending. Mills have booked additional first quarter tonnage at 2.00c to 2.10c, Chicago.

Awards Compared

	Tons
Awards this week	22,475
Awards last week	38,045
Awards two weeks ago	22,561
Awards this week in 1928	27,425
Average weekly awards, Dec.	35,000
Average weekly awards, 1928	39,082
Total awards to date, 1928	27,425
Total awards to date, 1929	22,475

CONTRACTS PLACED

8000 tons, No. 1 LaSalle street building, Chicago, to American Bridge Co.

7000 tons, hangar, Goodyear-Zeppelin Corp., Akron, O., to American Bridge Co.

2500 tons, cargo handling equipment, shapes and plates, South Manchurian railway, Darian, Manchuria, to Alliance Structural Co., and Alliance Machined Steel Casting Co., through Alliance Machine Co.

1500 tons, building, Edward Ford Plate Glass Co., Rossford, near Toledo, O., to McClintic-Marshall Co.

1100 tons, steel trestle work for Kansas City Southern railroad, to Kansas City Structural Steel Co.

650 tons, Miss Spence school, 22 East Ninety-first street, New York, to McClintic-Marshall Co., through George A. Fuller Co., general contract.

600 tons, bridge over Missouri river in Montana, to Missouri Valley Bridge & Iron Works.

400 tons, Nickel Plate railroad bridge Cleveland, understood awarded Bethlehem Steel Co.

155 tons, Farmers' bank, Beaver Falls, Pa., to Fort Pitt Bridge Works.

150 tons, addition, Wiscassett Mills Co., Albemarle, N. C., to Carolina Steel & Iron Co.

120 tons, two buildings, City Ice & Fuel Co., Cleveland and Willoughby, O., to National Iron & Wire Co.

110 tons, hangar, Boeing Field, Seattle, to Austin Co.

110 tons, apartment, Warfield avenue, Oakland, Calif., to Herrick Iron Works.

100 tons, building, Continental Lithographing Co., Cleveland, to the Republic Structural Iron Works, through Craig Curtiss Co., general contractor.

100 tons, store and garage building, Milwaukee, to Milwaukee Bridge Co.

190 tons, addition Jefferson Davis senior high school, Houston, Tex., to Houston Structural Steel Co.

CONTRACTS PENDING

34,050 tons, subway section 1 and 2, route 103; Corson Construction Co., low on general contract.

4000 tons, building, Edward Ford Plate Glass Co., Rossford, O. General contract to a Bentley & Sons, Toledo, O.

3000 tons, McChesney building, North Michigan avenue, Chicago; Holabird & Root, architects.

1000 tons, state highway bridge, New York.

804 tons, car shed for Santa Fe, Richmond, Calif., bids opened.

500 tons, factory building, South Bend, Ind.

500 tons, highway bridge over Hackensack river, New Jersey, to replace one which recently collapsed; Frederick Snare low on general contract.

250 tons, Denver avenue bridge, Portland, Oreg.; bids opened.

Wire Works Bookings Big

Springfield, Mass., Dec. 31.—Business already booked by the Cheney-Bigelow Wire Works indicates 1929 will be the company's best year, states Guy M. Perkins, vice president. An extra dividend of 25 cents on the preferred stock, to be paid from earnings, has been declared.

Concrete Bars

Despite Inaction Typical of Holidays, Tonnage Is High—Prospects Growing Bright

YEAR-END activity is surprisingly heavy, but a number of major projects are held for closing immediately after New Year's. Jobs in the Cleveland and Chicago territories run up to 500 tons apiece. Featured awards in the East take 1000 and 800 tons respectively. A 300-ton school was let at Buffalo.

REINFORCING BAR PRICES, PAGE 61

Buffalo, Dec. 31.—Award of 300 tons for a college building leaves no major tonnage pending. Current orders are entered at 2.515c, Buffalo warehouse. Bar joist demand is heavy.

Cleveland, Dec. 31.—While concrete bar awards have been few and far between for three weeks, prospects are bright for first quarter, 1929. Several jobs taking up to 500 tons each are scheduled for early figuring.

Chicago, Dec. 31.—With approximately 3000 tons of concrete bars to be awarded within 45 days, prospects are bright. Old prices have been withdrawn on billet bars, now 2.35c for 100 tons or more. Rail steel bars are 2.05c, Chicago.

Awards Compared

	Tons
Awards this week	3,478
Awards last week	2,500
Awards two weeks ago	2,888
Awards this week in 1928	11,850
Average weekly awards, Dec.	2,878
Average weekly awards, 1928	6,189
Total awards to date, 1928	11,850
Total awards to date, 1929	3,478

CONTRACTS PLACED

1000 tons, New York state hospital buildings, Orangeburg, N. Y., to Concrete Steel Co., through Niewenhaus Co.

800 tons, terminal, Delaware & Lackawanna railroad, Hoboken, N. J., to Jones & Laughlin Steel Corp., through Turner Construction Co., leaving 7800 tons pending for this job.

700 tons, No. 1 La Salle Street building, Chicago, to Olney J. Dean & Co.; previously reported to unstated fabricator.

385 tons, office building, Eighth and Hill streets, Los Angeles, to Pacific Coast Steel Co.

350 tons, Northwest Lions club, Chicago, to Calumet Steel Co.

300 tons, for Teachers' college building, Buffalo, to Kalman Steel Co.

215 tons, 15 state highway toll bridges, Alabama State Bridge Corp., Montgomery, Ala., to Concrete Steel Co.

115 tons, bridge, Pennsylvania railroad, Marion,

N. J., to McClintic-Marshall Co., through Arthur McMullen Co.
113 tons, two bridges, Newport Beach, Calif., to unstated interest.
100 tons, office building, Southern railway, Washington, to Knoxville Iron Co.
100 tons, bridge, Erie railroad, Rutherford, N. J., to McClintic-Marshall Co., through Arthur McMullen Co.

CONTRACTS PENDING

1000 tons, Chesapeake bridge foundations, Baltimore.
500 tons, Rosenwald Industrial museum, Jackson park, Chicago.
500 tons, buildings, Edward Ford Plate Glass Co., Rossford, O.; bids in.
400 tons, auditorium, Oberlin college, Oberlin, O., Cass Gilbert, New York, architect.
300 tons, mausoleum, W. J. Smith & Sons, Warren, O.

Methods of Fabrication Show Improvement

(*Concluded from Page* 37)

However, it does not reveal the true physical properties of the weld, as this depends to a great degree on the welder."

The use of procedure specifications is seen by some authorities as a method of obviating the necessity for a nondestructive test of the welds. Mr. Spraragen of the American Welding society says in this connection that "by welding under rigid procedure specifications it is possible to produce a standardized controlled quality of work with a minimum amount of variation in its physical properties."

Turning for the moment to riveting methods in construction and fabrication, in the opinion of A. F. Jensen, president, Hanna Engineering Works, Chicago, "Research in the proper working stresses for rivets in tension would be welcomed by the construction industry, particularly in connection with wind brace connection for multiple story structures. The technique of riveting also is worthy of further study."

Some construction experts have advocated the use of steel plates in the floor construction of modern steel buildings. Lee H. Miller, chief engineer, American Institute of Steel Construction Inc., New York, speaking before the annual meeting of the institute in November, at Biloxi, Miss., asserted that a "floor constructed of 4-inch I-beams spaced 24 inches center to center, with ½ by 24-inch plate welded to the top flange, would carry a load of 84 pounds per square foot over continuous supports and have a deflection of about 0.2 inch." In advocating the use of steel plate floors, Mr. Miller pointed out that probably no floor receives more severe treatment than the charging floor of an open-hearth furnace.

Business Experts See Only Good Indications for World in 1929

REVIEWS of the past year and the current position of trade and industry indicate a continuation of present conditions for 1929. No signs are seen by leading observers to indicate a turn downward within the next twelve months.

Dr. Julius Klein, director of the bureau of foreign and domestic commerce of the department of commerce, in summarizing conditions at the end of 1928, states that "domestic production and trade are in record volume and our foreign commerce continues to show a steady growth as a result of an increasing foreign demand for American manufactures. The maintenance of our imports at about the same level as in the two preceding years indicates the large purchasing power and general prosperity of the United States."

Gerard Swope, president, General Electric Co., Schenectady, N. Y., sees a favorable outlook for 1929. He says: "Basic economic conditions are sound, inventories not unusually expanded, credits and collections satisfactory, earnings of labor are high and employment steady, all of which presage a favorable outlook for 1929."

A similar situation is seen by E. M. Herr, president, Westinghouse Electric & Mfg. Co., New York. Summing up in his review of the year and outlook for next year he says: "Prospects for the coming year are very encouraging, as there is no indication of a reduction in the rate of general electrical progress, and there is reason to believe that the demand for electrical apparatus for railroad electrification, ship equipment and certain other applications will be materially increased."

Represents Composite Forecast

Presenting a composite of the collective interpretation of business statistics gathered by statisticians and economists of industrial and trade organizations and large industrial corporations representing about 30 of the leading industries of the country, the National Industrial Conference board sees only good in the present situation. Its conclusion is as follows:

"The year 1928 as a whole has been a year of industrial and commercial activity slightly higher than in the preceding year, but little if any above the normal annual rate of expansion of general business except for a few months in the last half of the year. The automobile and building industries have continued to be the leading factors in the business movement; the extraordinary expansion of stock exchange activity during the year, as in preceding years since 1923, stands in strong contrast to the general growth of industry and trade."

William F. Whiting, secretary of commerce, Washington, says in general it may be stated that both industry and trade are exceptionally active as we enter the New Year. In his survey Mr. Whiting says: "Some of the more important economic forces which dominate the business situation as we enter the new year are credit conditions, the degree of accumulation of merchandise stocks and of speculation in them, the size of the crops and of our current industrial output, the rate of wages and volume of employment and the prospects of foreign trade." In all these factors he finds conditions favorable to a high degree, with no untoward situation in any.

World Conditions Favorable

The National Foreign Trade council, surveying the world field for American products, sees nothing but good in sight. It states in its review of export conditions: "The outstanding developments for the year in American foreign trade have been the unusually high export balance and the very large proportion of manufactured goods among our exports. The anticipated balance in favor of exports is our highest since 1924 and the highest, except for that year, since 1921. The high proportion of manufactured goods among our exports, over 70 per cent for 1928, adds a stabilizing factor to our trade as these are the products that respond to American salesmanship abroad and are carrying us forward each year to new levels of progress."

James A. Campbell, president, Youngstown Sheet & Tube Co., sees bright prospects for 1929. He says:

"Capacity of the steel industry will not require enlargement. Much money will continue to be spent on improvements designed to reduce costs, but little will be spent for additional capacity except that demanded by local conditions.

"Youngstown Sheet & Tube Co. will enjoy fair earnings next year. We have spent much money this year to lower costs and will derive benefits from these improvements early in 1929. We will spend more money in the same direction in 1929."

Foreign Trade Totals Exceed 1927

Eleven-Month Exports of Iron and Steel Top All Last Year—November Shipments Gain Slightly but Imports Increase Is Large

IRON and steel exports from the United States in November totaled 256,886 tons, making a gain of 16 tons over October, according to figures supplied by the department of commerce. Imports totaled 67,103 tons in November, compared with 63,880 tons in October. The total for the 11 months of 1928 for exports was 2,641,187 tons, and for imports 696,404 tons, both figures being superior to the corresponding total in 1927.

IMPORTS AND EXPORTS

Gross Tons

	—1928—		—1927—	
	Imports	Exports	Imports	Exports
Jan.	58,635	205,766	63,404	215,235
Feb.	47,628	185,915	49,451	166,128
March	74,128	221,935	61,872	171,094
April	71,579	215,184	60,374	192,339
May	72,106	267,890	79,814	202,708
June	65,819	262,052	69,017	184,364
July	47,830	253,336	61,112	190,502
Aug.	69,914	287,297	68,386	175,636
Sept.	57,782	228,056	58,464	166,352
Oct.	63,880	256,870	52,503	170,255
Nov.	67,103	256,886	61,882	177,928
(11 mos.)	696,404	2,641,187	685,804	2,014,672
Dec.	.....	.....	64,188	168,428
Total	.....	.....	750,467	2,180,969

IMPORTS OF IRON AND STEEL

(Gross Tons)

Item:	Nov. 1928	Oct. 1928	January through Nov. 1928	January through Nov. 1927
Pig iron	10,934	14,108	129,819	118,269
Ferromanganese and alloys (1)	5,177	4,039	43,893	25,689
Ferrosilicon (2)	773	155	3,891	6,965
Ferrochrome (3)	25	65	660	435
Iron slabs	....	....	4	91
Scrap	9,175	9,938	56,763	56,747
Steel ingots, blooms, billets, etc	1,599	2,005	20,218	11,755
Steel bars	6,399	4,759	82,090	83,381
Iron bars	654	67	2,334	3,404
Wire rods	1,892	948	14,970	16,915
Hoops, bands and scrolls	1,755	1,794	19,092	31,756
Boiler and other plate	1,159	2,091	7,918	3,491
Sheets, skelp and saw plate	816	782	21,510	14,387
Tin Plate	6	48	871	1,054
Structural shapes	11,806	10,530	153,505	147,319
Rails and splice bars	452	1,057	14,491	15,504
Cast iron pipe	6,113	3,838	57,265	78,652
Other pipe and tubes	4,782	4,796	41,091	48,423
Barbed wire	1,111	572	4,804	3,766
Round iron and steel wire	423	606	4,249	3,667
Steel telegraph and telephone wire	....	5	183	32
Flat wire and strip steel	305	222	2,262	2,399
Wire rope and strand	147	117	1,519	2,028
Other wire	183	50	684	1,128
Nails, tacks and staples	1,126	1,089	9,337	5,441
Bolts, nuts, rivets and washers	5	46	227	330
Castings and forgings	286	153	2,754	2,776
Total	67,103	63,880	696,404	685,804

(1) Manganese content.
(2) Silicon content.
(3) Chromium content.

ORIGIN OF PIG IRON IMPORTS

Gross Tons

From:	Nov.	Oct.
Netherlands	1,938	896
Norway	131	280
United Kingdom	250	7,702
Canada	123	162
Mexico	33	31
British India	8,459	4,610
Belgium	.....	20
France	.....	30
Sweden	.....	377
Totals	10,934	14,108

ORIGIN OF IRON ORE IMPORTS

Gross Tons

From:	Nov.	Oct.
Cuba	44,000	.....
Chile	150,800	91,000
Algeria and Tunis	14,000	41,500
Sweden	7,400	.....
Switzerland	6,944	.....
Germany	.....	1,037
Spain	.....	7,557
United Kingdom	.....	5,807
Brazil	.....	9,000
Dutch W. Indies	.....	11,500
Japan	.....	6
Australia	.....	2,500
Totals	223,144	169,902

ORIGIN OF MANGANESE IMPORTS

Gross Tons

From:	Nov.	Oct.
Soviet Russia in Europe	6,575	12,600
Canada	1,898	41
Brazil	3,534	6,469
British India	1,769	6,273
British W. Africa	2,365	.....
Germany	.....	16
Chile	.....	632
Totals	16,141	26,031

ORIGIN OF FERROMANGANESE IMPORTS

(Concentrates)

Gross Tons

From:	Nov.	Oct.
France	38	21
Norway	1,241	1,760
United Kingdom	2,102	420
Canada	1,760	1,653
Italy	36	185
Totals	5,177	4,039

ORIGIN OF IMPORTS

Gross Tons

From:	Steel bars	Cast iron pipe	Steel scrap	Ingots, blooms, etc.
Belgium	1,752	711	.....	1,387
France	1,081	5,138	.....	137
Germany	2,531	261	50	6
Sweden	884	.....	185	64
United Kingdom	108	.....	30	4
Austria	13	.....	.....	.....
Czechoslovakia	19	.....	.....	.....
Norway	3	.....	.....	.....
Canada	8	.....	8,865	1
Italy	.....	.....	45	.....
Totals	6,399	6,113	9,175	1,599

IMPORTS BY COUNTRIES OF ORIGIN

Gross Tons

	Nov. 1928	January through Nov. 1928	January through Nov. 1927
Austria	14	363	946
Belgium	12,439	174,534	184,139
Czechoslovakia	848	2,718	4,868
France	9,332	114,442	125,411
Germany	13,495	113,083	121,008
Italy	81	858	374
Netherlands	2,696	28,706	27,820
Norway	1,934	13,609	7,042
Spain	10	207	30
Sweden	2,505	26,073	19,728
Switzerland	1	45	.....
United Kingdom	3,681	82,479	50,328
Canada	11,575	76,287	68,871
Mexico	33	515	239
British India	8,459	51,396	51,105
China	.....	7	.....
Japan	.....	80	26
Poland and Danzig	.....	3,731	6,735
Denmark	.....	205	151
Hungary	.....	141	.....
Cuba	.....	15	6,143
Dominican Republic	.....	806	.....
Ecuador	.....	700	.....
Virgin Is. of U. S.	.....	3	31
Syria	.....	13	.....
New Zealand	.....	2,001	.....
Morocco	.....	5	.....
Panama	.....	381	19
Jamaica	.....	628	.....
Other countries	.....	.....	129
Totals	67,103	696,404	685,804

EXPORTS OF IRON AND STEEL

(Gross Tons)

Item:	Nov. 1928	Oct. 1928	January through Nov. 1928	January through Nov. 1927
Pig iron, not including ferro-alloys	12,177	11,532	76,268	47,913
Ferromanganese and spiegeleisen	423	143	8,858	1,566
Scrap	16,306	39,413	479,006	216,491
Ingots, blooms, skelp, etc	28,123	21,885	156,417	96,003
Iron bars	1,959	136	5,017	3,778
Steel bars	18,409	16,264	143,642	103,143
Alloy steel bars	1,054	1,211	13,372	5,449
Wire rods	3,251	3,425	35,237	14,680
Plates	21,515	16,456	147,533	124,188
Galvanized sheets	12,672	13,046	138,417	142,607
Black steel sheets	11,744	14,258	166,570	144,344
Black iron sheets	1,669	1,741	14,835	14,641
Hoops, bands and strip steel	4,981	5,433	52,469	40,408
Tin plate, terne plate, etc	28,683	18,180	232,335	238,034
Structural shapes, plain material	27,755	25,847	185,694	133,866
Structural shapes, fabricated	10,392	7,413	85,243	64,612
Metal lath	555	445	5,007	4,250
Steel rails	6,870	9,347	177,347	161,869
Rail fastenings, switches, frogs, etc	2,148	2,330	38,738	29,997
Boiler tubes and welded pipe	21,350	24,004	229,864	230,319
Malleable iron screwed pipe fittings	832	927	10,515	9,233
Cast iron screwed pipe fittings	1,338	640	6,688	6,551
Cast iron pressure pipe and fittings	422	260	9,017	11,208
Cast iron soil pipe and fittings	1,563	1,924	15,537	8,605
Plain wire	4,356	4,380	42,638	32,544
Barbed wire and woven wire fencing	7,476	7,397	68,970	48,265
Wire cloth and screening	173	107	1,678	2,088
Wire rope	461	445	4,755	4,149
Insulated wire and cable	104	68	597	470
Other wire and manufactures of	930	1,451	9,769	8,703
Wire nails	844	968	13,540	7,774
Nails, other than wire	762	841	8,352	7,581
Tacks	56	45	668	821
Horseshoes	45	35	420	509
Bolts, nuts, rivets, except track	1,588	1,117	12,421	11.03
Car wheels and axles	1,427	752	14,586	15,834
Iron castings	790	675	9,815	10,199
Steel castings	707	651	8,581	6,431
Forgings	976	1,678	10,771	4,517
Total	256,886	256,870	2,641,187	2,014,672

Mergers Increase Under Severe Competition

(*Concluded from Page* 35)

other lines. In the iron and steel industry this undoubtedly results from the huge amount of capital required for the industry. In the main, however, the attitude of the public and government toward big business combinations has had an almost complete reversal since the beginning of the present century. The country has become accustomed to big scale industry, which it is now recognized is absolutely essential if the national needs are to be adequately served.

Out of this has gone a rather widespread belief that some revision of the Sherman antitrust law should be made, at least to the extent of modernizing the law in keeping with modern conditions.

The fact remains, however, that the government appears generally favorable to mergers. From all present indications this movement has nowhere reached the limit and the next decade very likely will see the evolution of business units with assets many times those to which the country is accustomed today.

National Tube May Build

Pittsburgh, Dec. 31.—Unconfirmed reports say the National Tube Co., of which Fred W. Waterman has just been made president, will spend about $40,000,000 improving its plant at McKeesport. It is reported that seamless tubing equipment will be installed, which would necessitate provision for making open-hearth steel.

Furniture Orders Drop

Washington, Dec. 31.—New orders for steel furniture dropped sharply in November, according to the department of commerce.

Cornelius Quits Tube Co.

Pittsburgh, Dec. 31.—William A. Cornelius, 28 years with the National Tube Co. and more than 20 years general manager, has resigned as manager of the McKeesport, Pa., works of the company.

December Iron Output Off Slightly

DAILY average production of coke pig iron declined slightly in December from the 1928 peak, which was reached in November, but nevertheless was sufficiently large to be the second best December on record.

December's rate, as estimated by IRON TRADE REVIEW, was 108,912 tons, which compares with 110,155 tons in November and 87,039 tons in December, 1927. The highest December in history was in 1918, when the rate was 110,778 tons. In dropping slightly from November, December follows the lead of the past three years.

MONTHLY PRODUCTION

	1928	1927	1926	1925
Jan.	2,855,515	3,101,346	3,319,789	3,372,207
Feb.	2,898,668	2,940,604	2,923,850	3,214,067
Mar	3,199,175	3,482,107	3,458,171	3,571,422
April	3,181,975	3,424,377	3,438,805	3,211,235
May	3,292,790	3,391,067	3,477,820	2,933,907
June	3,082,340	3,089,726	3,232,478	2,679,045
July	3,072,711	2,954,625	3,224,663	2,665,262
Aug.	3,136,995	2,950,674	3,200,723	2,707,171
Sept.	3,063,593	2,782,500	3,163,269	2,725,885
Oct.	3,373,539	2,812,015	3,334,206	3,017,889
Nov.	3,304,656	2,661,863	3,237,992	3,023,257
Dec.	3,376,267	2,698,208	3,089,175	3,249,057
Total	37,838,224	36,289,112	39,100,941	36,370,404

The month's total of 3,376,267 tons, also an estimate, compares with a revised total of 3,304,656 tons in November and only 2,698,208 tons in December, 1927.

December's output brings the 1928 production of coke pig iron up to 37,838,224 tons. This is a fair gain over the 36,289,112 tons of 1927. It falls short, however, by a good margin from the record 40,025,350 tons of 1923.

A harbinger of improvement for January is seen in the fact that as of Dec. 31 three more blast furnaces were active than at the close of November. Four merchant stacks were lighted and one was blown out in December. On the steelworks side, there was a balance of four out and four in. As a result, 197 stacks were active Dec. 31.

The merchant stacks which blew in last month included one each by the Jackson Iron & Steel Co., Reading Iron Co., St. Louis Gas & Coke Corp. and Struthers Iron & Steel Co. The New Jersey Zinc Co. blew out a stack at Palmerton. The increases in steelworks stacks were registered by the Tonawanda Iron Co., Inland Steel Co., Carnegie Steel Co. and Youngstown Sheet & Tube Co. The steelworks stacks blown out were one by the Youngstown company and three by the Bethlehem Steel Co.

Rate of Operation

(Relation of Production to Capacity)

	1928†	1927*
Dec.	80.4	61.8
Nov.	81.1	63.0
Oct.	79.3	64.5
Sept.	75.2	65.9
Aug.	74.4	67.6
July	73.2	67.7
June	76.0	73.2
May	78.3	77.7
April	78.0	81.2
March	76.1	79.8
Feb.	73.6	74.7
Jan.	67.8	71.2

***Based on coke pig iron capacity of 51,379,400 gross tons as of Dec. 31, 1926. †Based on capacity of 49,605,720 tons as of Dec. 31, 1927. Capacities computed by American Iron and Steel institute.**

DECEMBER PIG IRON PRODUCTION

	No. in blast last day of month		—Totals—	
	Dec.	Nov.	Dec.	Nov.
Ohio	45	43	787,577	759,026
Pennsylvania	68	68	1,134,143	1,150,672
Alabama	19	19	247,858	229,055
New York	12	12	185,476	194,161
Illinois	17	16	332,542	316,776
Colorado	3	3		
Indiana	14	13		
Maryland	4	5	445,134	416,080
Virginia	1	1		
Wisconsin	0	0		
Kentucky	2	2		
Massachusetts	1	1		
Tennessee	1	1	115,477	114,158
Utah	1	1		
West Virginia	3	3		
Michigan	4	4		
Minnesota	2	2		
Missouri	0	0	93,514	85,917
New Jersey	0	0		
Texas	0	0		
Spiegel and ferro—all states	....	....	34,546	38,811
Total	197	194	3,376,267	3,304,656

AVERAGE DAILY PRODUCTION

	1928	1927	1926	1925	1924
Jan.	92,113	100,043	107,039	108,781	97,273
Feb.	99,954	105,021	104,423	114,788	105,987
Mar.	103,199	112,326	111,554	115,207	111,787
Apr.	106,066	114,146	114,627	107,041	107,537
May	106,219	109,388	112,187	94,642	84,515
June	102,745	102,991	107,749	89,301	67,427
July	99,120	95,311	104,021	85,976	57,531
Aug.	101,193	95,183	103,249	87,328	60,741
Sept.	102,120	92,750	105,442	90,862	68,454
Oct.	108,824	90,710	107,555	97,351	79,419
Nov.	110,155	88,728	107,933	100,775	83,832
Dec.	108,912	87,039	99,651	104,808	95,367
Ave.	102,871	99,422	107,126	99,645	84,908

December's production of merchant iron, at 654,413 tons, shows a slight increase over the 632,869 tons of November; it was, in fact, the highest total of 1928. The month's nonmerchant production, at 2,721,854 tons, gained moderately over the 2,671,787 tons of November but fell slightly short of the year's peak, which was attained in October. December output of ferromanganese and spiegeleisen was 34,546 tons, against 38,811 tons in November.

Building work in Illinois including many large buildings in Chicago and other cities, during 1928 was 13 to 15 per cent greater than in 1927.

Personals

EDWARD S. KNISELY, until recently vice president and head of the general sales department of the Bethlehem Steel Co., has resigned and as of Jan. 1 retired after 38 years of active service with that company. In 1890 he became identified with it as an apprentice machinist and for 11 years worked in various manufacturing departments, but in 1901 became connected with the sales department. In 1915 he was made head of the general sales department and in August, 1927, the duties of the vice presidency were added.

* * *

William J. Stoop resigned as general manager of the Morgan Engineering Co., Alliance, O., effective Dec. 21.

* * *

Ralph W. Clark, widely known in the merchant pig iron business and who last September severed his connection with the line to become vice president and general sales agent of the Hudson Coal Co., was elected vice president and general sales agent of the Chateaugay Ore & Iron Co. and the Chazy Marble Lime Co., effective Jan. 1. Mr. Clark continues as vice president and general sales agent of the Hudson Coal Co., of which the other two companies are subsidiaries. In his Chateaugay Ore & Iron Co. connection Mr. Clark assumes charge of the sale of the output of one of the country's oldest producers of copper free low phosphorus iron, with blast furnace at Standish, N. Y., and ore deposit nearby at Lyon Mountain, N. Y. The furnace now is resuming production after a brief idle period. Mr. Clark also will direct the sale of the Chazy Marble Lime Co.'s output, at Chazy, N. Y., of raw, caustic and hydrated lime for chemical and agricultural purposes. Mr. Clark resides at Scranton, Pa., which will continue to be his headquarters.

Mr. Clark began his affiliation with the pig iron business 28 years ago in the Chicago office of Rogers Brown & Co. Later he went to Buffalo, then to Boston and later to New York, being pig iron salesman for that company in the latter city for 15 years. In 1922 he became New York district sales agent for Pilling & Co., later being elected director and vice president of that company. During his service with Pilling & Co. the Chateaugay company's iron was among the brands he sold, and he also is credited with introducing the use of this low phosphorus iron in gray iron mixtures. It previously had been used almost exclusively in steel castings. Mr. Clark left Pilling & Co. last September to assume his present connection with the Hudson Coal Co.

During the war Mr. Clark was chief

RALPH W. CLARK

of the raw materials priority division of the ordnance department at Bridgeport, Conn. He also was regional priority advisor for the government in the important district supervised from Bridgeport.

Associated with Mr. Clark is E. J. Burnes who has been appointed assistant general sales agent of the Chateaugay and Chazy companies, as of Jan. 1. Mr. Barnes served under Mr. Clark with Pilling & Co. from 1922 to 1928.

* * *

Taylor Allderdice, since April 19, 1926, president of the National Tube Co., Pittsburgh, resigned effective Jan. 1. In his 36-year connection with the Tube company and its predecessors Mr. Allderdice is believed to have served in every "key" post. From 1899 to 1926, when he succeeded William B. Schiller, Mr. Allderdice followed Mr. Schiller in every position. Mr. Allderdice was born in Philadelphia, March 1, 1863, and received his education in the schools there. His identification with the steel industry began in 1881. He plans to spend the next year traveling.

Fred W. Waterman, who has been promoted from manager of the Gary, Ind., plant of the Tube company to succeed Mr. Allderdice as president, is a native of Illinois, being born at Sycamore, that state, 52 years ago. He was graduated from the University of Illinois. He has been head of the Gary plant since 1923, going there to supervise the construction of the company's plant there. His affiliation with the Tube company began in 1916.

* * *

E. Kamper, works manager at Toledo, O., of Steel & Tubes Inc., subsidiary of the Republic Iron & Steel Co., Youngstown, O., and who has been with the company the past five years, has been placed in charge of the new Ferndale, Mich., plant which is scheduled to be in production shortly after Jan. 1. Howard C. Kaighin, superintendent of the Toledo plant, also is being transferred to Ferndale. Otto L. Miller, Detroit, district manager, is in charge of sales in the Michigan territory, with headquarters at 2-230 General Motors building.

Obituaries

MARTIN HAWKE, 66, managing director of the Carborundum Co., Ltd., Manchester, England, died there Dec. 20, following a brief illness.

Mr. Hawke was born in Cornwall, England, but as a young man located in America and became identified with the Hudson-Chester Granite Co., Chester, Mass. There he became interested in carborundum, and in August, 1900, he was employed by the Carborundum Co. as its continental representative. For several years he traveled Europe in the interests of his company and established agency representations in many foreign countries.

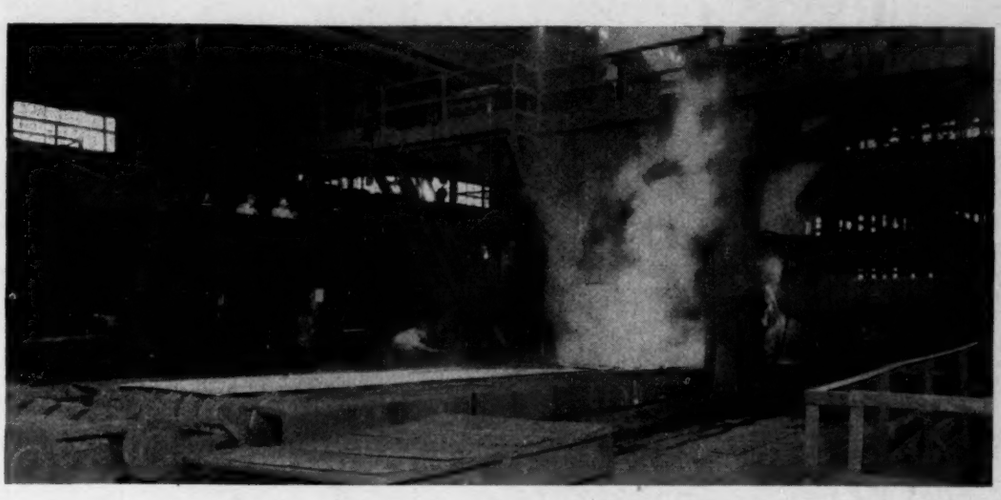
When in 1912 the plant of Carborundum Co. Ltd. was built at Manchester, England, Mr. Hawke was active not only in planning the plant but in putting it into production. Upon its completion he was made managing director.

* * *

Harry J. Finley, secretary of the Burnside Steel Foundry Co., Chicago, died Dec. 23, following a brief illness.

* * *

John L. Perkins, 54, chairman of the board of B. F. Perkins & Son Inc., machinery manufacturer, Holyoke, Mass., died Dec. 27.



Sheared Plate Mill, Youngstown Sheet & Tube Co., Brier Hill Works

Domestic Market Reviews for 1928

Pig Iron	Ferroalloys
Coke	Structural Shapes
Semifinished Steel	Rails
Tin Plate	Sheets
Cast Iron Pipe	Plates
Merchant Bars	Nonferrous Metals
Welded Pipe	Old Material
Wire Products	Coal By-Products
Warehouse	Strip
Refractories	Canadian Markets

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Record Steel Production and Rising Prices Quicken 1928 Markets

Hopes for 50,000,000-ton Ingot Year Realized—Producers Display More Unity—Scrap Use Hits Pig Iron—1929 Outlook Bright

By E. C. Barringer

BY ITS unprecedented production of steel 1928 has set a new standard of comparison. At least seven, perhaps eight, new monthly ingot records were established last year. April attained the highest daily steelmaking rate of any month in history, only to be outstripped by October. By quarters, by halves, in its entirety, 1928 surmounted all previous production peaks.

With December estimated, the year's total of open hearth and bessemer ingots was 49,758,000 gross tons, 12 per cent over 1927 and 8 per cent greater than in record 1926. If the output of crucible and electric steel be included, then 1928 realized the 50,000,000-ton steel year which some of the elder statesmen have foreseen. Certainly a new gage for future efforts was set up last year.

Automotive Consumption Is Chief Support

This swift pace was maintained without evidence of strain. And there being no appreciable stocks in either producers' or consumers' hands at any time, a record production connotes a record consumption. Again the automobile industry with its many ramifications lent relatively greater support than the railroads, the time-honored main buttress of the iron and steel markets. It is significant that record automobile and steel output coincided in 1928.

Farm implement and tractor manufacturers were heavier buyers of steel than in 1927. The building industry confounded many observers by increasing its takings of steel. Line pipe orders, in which welded construction played an increasingly important role, filled up the mills in mid-year. Railroad specifications for track material paralleled 1927 but freight car orders, estimated at 47,000, were the lowest since 1921.

Pig iron's star was of lesser magnitude than steel's in 1928, chiefly because low-priced scrap was available much of the year, yet the movement to melters, the forward buying at the turn of the fourth quarter, and the price advances from late September to early November provided the year's most spectacular market activity.

Granting that 1928 has passed into history noteworthy for its high production, the recovery in iron and steel prices crowds for secondary attention. In general prices may be said to have acquired strength with the production bulge of the first quarter, to have given ground in the second quarter, only to come back strongly in the third quarter and hold these gains as the year closed. The accretions in price were not at all commensurate with the startling high level of production. but considering all iron and steel lines consumers were paying about $2 more per ton at the close than at the beginning of 1928. Despite this show of strength, 1928 prices scarcely average up to 1927.

Shrinking Profits Induce Solidarity

This upward trend in prices in the face of the buyers' market which characterized iron and steel most of the year attests the growing conviction of producers that they faced grave dangers unless they put prices on a more remunerative basis.

Statistical Record of 1928 Compared with 1927

In Production

	*1928	1927
Coke Pig Iron (gross tons)	37,782,000	36,289,112
Steel Ingots (gross tons)	49,758,000	43,397,743
Coke (net tons)	51,980,000	51,092,143
Autos and Trucks (U.S.)	4,300,000	3,401,326
Freight Cars Ordered (U.S.)	47,000	63,295

*December estimated.

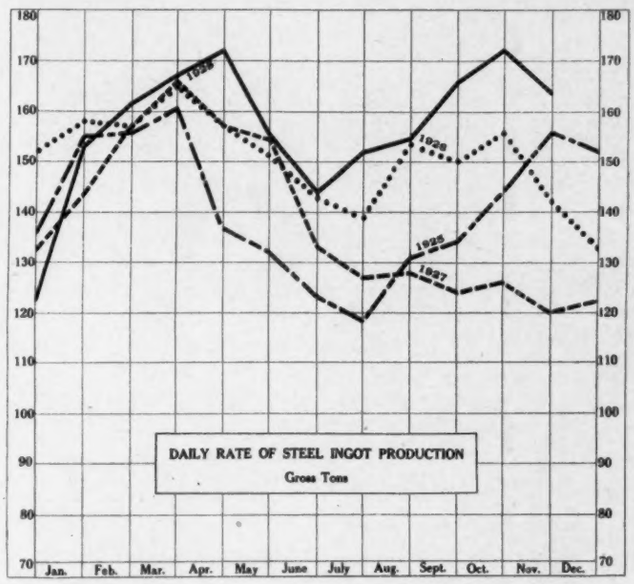
***In Prices**

	1928	1927
10 Pig Iron	$18.15	$19.20
2 Semifinished Steel	33.40	33.70
7 Heavy Finished Steel	1.96c	1.93c
6 Steel Sheet	2.89c	3.04c
6 Scrap	$14.35	$14.40

*Average prices on typical grades in representative markets.

More solidarity was displayed by producers than at any time since the war. The revised extras on many products, notably strip, in which two bases were substituted for three, and the imposition of quantity differentials on small lots to distinguish more clearly between mill and warehouse business are evidence of this tendency.

Market history for 1928 must be written in unusually large figures. More than one oil or gas pipe line required upward of 50,000 tons of steel. There was a structural award of 57,800 tons for the Cleveland Union Terminal and 45,000 tons for a mercantile building at Chicago. Late in the year eastern shipyards were figuring on projects requiring 100,000 tons of plates. Freight car inquiry in December attained a height of 15,500, contemplating the purchase of over 150,000 tons of steel. In the first nine months an easy delivery situation obtained. With marked equanimity the mills piled up production records with operating schedules scarcely a week in length. Increasingly big users resorted to the telephone instead of to the mails to transmit specifications. In October there was some anticipation of requirements when the price structure seemed likely to rise at a faster rate than after events proved, but compared with prewar stocks the accumulations were of negligible proportions.



Twin peaks of steel production, April setting an all-time record only to be surpassed by October, featured 1928

Through all of 1928 the iron and steel industry pursued its course unmindful apparently of extraneous events. Neither congress nor the presidential campaign was reflected in any market development, though it might be said that the election intensified expectations of continued good business ahead. The strong stock market and consequent tighter money market in the latter months did not restrict demand for iron and steel. Changes in the tariff, of which the 50 per cent increase in the duty on fluorspar is outstanding, were of only minor market significance.

In finished steel prices the trend in the past year was distinctly toward delivered rather than base quotations. Increasingly was advantage taken of mill location to corral business naturally tributary to it. Cleveland became a base for steel bars for outside as well as local mills. The lucrative business of the automobile industry in the greater Detroit area evoked prices based on mill location or water transportation rather than a flat Pittsburgh or Chicago base.

When final statistics for 1928 are available it will be found that the iron and steel traffic on inland waters, particularly those of the Pittsburgh district and the Ohio-Mississippi systems, exceeded that of any previous year by a wide margin. Year-round traffic on the Ohio river is now a fact. Less pig iron was carried on the Great Lakes in 1928 than in 1927 but the movement of scrap and finished material increased appreciably.

A much more favorable balance in the country's foreign trade in iron and steel resulted from a substantial gain in exports while imports remained stationary. With the latter months estimated, the year's volume of exports exceeded 2,750,000 tons, contrasted with 2,180,969 tons in 1927, while imports estimated at 740,000 tons compare with 750,000 tons the year preceding. Foreign cast iron pipemakers occasionally sold tonnages that aroused comment, but in general less was heard of alien material in 1928 than in 1927. The course of iron and steel prices in 1928, as revealed by IRON TRADE REVIEW composite of 14 leading products, was the reverse of 1927. Then the year's high of $38.06 was reached in the first week, and prices deteriorated until the low of $35.07 was reached in December. In 1928 the high of $36.24 was made in the last week and the low of $34.85 in July.

Few years are swept in on so high a crest as 1929 has been. If only the more conservative estimates of automobile production are borne out the 1928 record will be bettered fully 20 per cent. Another year of negligible equipment buying by the railroads prompts the conviction the long-expected year of replacement has dawned. Impetus from federal aid is firing the shipbuilding industry with enthusiasm not approached since the war. The unusual number of building projects scheduled for 1929 bespeaks support from that quarter. The government at Washington is favorably inclined to business, and is world-trade-minded. Industrial leaders cannot detect any curtailment of the buying power which has carried American business to new heights.

Domestic Iron and Steel Prices in 1928

Average Monthly Prices of Leading Materials at Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Bessemer	$19.26	$19.26	$19.21	$19.26	$19.26	$18.76	$18.76	$18.76	$18.86	$19.11	$19.96	$20.01
Basic (valley)	17.00	17.00	17.00	16.75	16.20	15.81	15.95	16.00	16.10	16.85	17.70	17.50
Foundry No. 2	19.01	19.01	19.01	19.01	18.86	18.61	18.25	18.26	18.61	18.76	19.56	19.76
Malleable	19.01	19.01	19.01	19.01	19.01	18.76	18.76	18.76	18.86	19.11	19.66	19.26
Gray Forge	18.51	18.51	18.51	18.56	18.76	18.76	18.76	18.01	18.01	18.26	18.66	19.26
Bessemer Ferrosilicon 10 per cent	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
SEMIFINISHED												
Billets, Bessemer	$33.00	$33.00	$33.00	$33.00	$33.00	$32.50	$32.25	$32.00	$32.00	$32.75	$33.00	$33.00
Billets, Open Hearth	33.00	33.00	33.00	33.00	33.00	32.50	32.25	32.00	32.00	32.75	33.00	33.00
Sheet Bars, Bessemer	34.00	34.00	33.70	34.00	34.00	33.50	32.25	32.20	33.00	33.00	33.60	34.00
Sheet Bars, Open Hearth	34.00	34.00	33.70	34.00	34.00	33.50	32.25	32.20	33.00	33.00	33.60	34.00
Wire Rods	41.50	43.50	44.00	44.00	44.00	44.00	42.00	42.00	42.00	42.00	42.00	42.00
COKE												
Furnace, Spot	$2.70	$2.65	$2.60	$2.60	$2.55	$2.60	$2.60	$2.75	$2.75	$2.80	$2.85	$2.75
Foundry, Spot	3.75	3.75	3.75	3.65	3.55	3.50	3.50	3.75	3.75	3.75	3.75	3.75
ROLLED PRODUCTS												
Structural Shapes	1.80c	1.85c	1.90c	1.85c	1.85c	1.85c	1.85c	1.85c	1.90c	1.95c	1.95c	1.90c
Plates, base	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
Steel Bars, base	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
Cold Finished Steel Bars	2.20	2.25	2.25	2.20	2.20	2.15	2.10	2.15	2.20	2.20	2.20	2.20
Strip, Hot Rolled—												
To 3 inches wide	*2.10	2.15	2.20	2.15	2.15	2.10	2.10	2.05	2.10	2.10	2.00	2.00
3 to 6 inches wide	†2.10	2.10	2.10	2.05	2.00	2.00	2.00	1.95	1.95	2.00	a1.90	1.90
6 to 12 inches wide	1.85	1.85	1.90	1.90	1.85	1.85	1.90	1.85	1.80	1.80	b1.80	1.85
Strip, Cold Rolled, base	3.00	3.10	3.15	2.75	2.75	2.75	2.75	2.70	2.70	2.75	2.80	2.85
Steel Pipe, 1 to 3-inch (disct.)	.62	.62	.62	.62	.62	.62	.62	.62	.62	.62	.62	.62
Standard Spikes, base	2.70	2.75	2.75	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Wire Nails, base	2.50	2.60	2.65	2.60	2.60	2.60	2.55	2.55	2.55	2.55	2.55	2.55
Plain Wire, base	2.40	2.45	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40	2.40	2.50
Structural Rivets, base	2.75	2.75	2.80	2.90	2.90	2.90	2.90	2.85	2.80	2.80	2.80	2.50
No. 24 Black Sheets	2.80	2.85	2.85	2.75	2.75	2.70	2.65	2.65	2.65	2.70	2.80	2.85
No. 10 Blue Annealed	2.10	2.10	2.10	2.05	2.00	2.00	2.00	2.00	2.00	2.00	2.05	2.00
No. 24 Galvanized Sheets	3.65	3.65	3.75	3.65	3.65	3.55	3.50	3.50	3.50	3.50	3.55	3.60
Tin Plate, base box	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.30	$5.35
OLD MATERIAL												
Heavy Melting Steel	$15.35	$15.05	$14.75	$14.85	$15.00	$14.70	$14.10	$15.00	$16.55	$17.35	$17.35	$17.50
Low Phosphorus	18.85	18.50	18.20	18.35	18.50	18.50	18.50	19.00	20.00	20.75	21.00	21.00
No. 1 Cast	14.50	14.50	14.50	14.75	14.60	14.00	14.00	14.05	14.25	14.55	15.10	14.75

*Hoops †Bands a—Applies on all sizes up to 6 inch. b—Applies on all sizes 6 1/8 inch to 24 inch.

Average Monthly Prices of Leading Materials at Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Lake Superior Charcoal	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04
Northern No. 2 Foundry	18.50	18.50	18.50	18.50	18.20	18.00	17.60	17.60	18.25	18.80	20.00	20.00
Southern No. 2 Foundry	22.01	22.01	22.01	22.01	22.01	21.95	21.69	21.66	22.26	22.26	22.39	22.51
Malleable	18.50	18.50	18.50	18.50	18.20	18.00	17.60	17.60	18.25	18.80	20.00	20.00
Bar Iron	1.90c	1.95c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c
Rail Steel Bars	1.80	1.80	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.90	1.95	2.00
Soft Steel Bars	1.90	1.95	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Structural Shapes	1.90	1.95	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Plates	1.90	1.95	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
No. 24 Black Sheets	3.05	3.05	3.05	3.05	2.85	2.80	2.80	2.80	2.85	2.90	3.00	3.00
Heavy Melting Steel	$12.25	$12.55	$12.75	$12.75	$12.95	$12.60	$12.30	$12.65	$12.90	$13.75	$14.50	$14.50
No. 1 Railroad Wrought	12.65	12.40	12.45	12.45	13.05	12.70	12.30	12.40	12.90	13.50	14.25	14.50
Rails for rolling	15.00	15.00	14.45	14.00	14.35	14.85	14.50	15.00	15.80	16.40	16.50	16.50
Car Wheels, iron	13.70	14.25	13.95	13.50	13.45	13.10	13.00	13.00	13.00	13.15	14.05	14.25
No. 1 Cast (mchy)	15.75	15.75	15.65	15.65	15.90	15.95	15.95	15.95	16.30	16.55	16.90	17.35

Average Monthly Prices of Leading Materials in the East

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Basic, Eastern Pennsylvania	$19.50	$19.50	$19.50	$19.25	$19.10	$19.10	$19.00	$19.00	$19.00	$19.75	$19.75	$19.75
No. 2X Foundry, Philadelphia	20.51	20.91	21.26	21.26	21.26	21.26	20.76	20.76	21.01	21.26	21.51	21.76
No. 2X Virginia, furnace	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.00	21.25
Standard Low Phosphorus, Phila	24.76	24.76	24.76	24.76	24.76	24.51	24.51	24.51	24.26	24.26	24.26	24.26
ROLLED PRODUCTS												
Tank Plates, base, Philadelphia	2.05c	2.10c	2.10c	2.10c	2.05c	2.10c	2.10c	2.10c	2.10c	2.15c	2.15c	2.15c
Structural Shapes, base, Phila	2.08	2.08	2.08	2.08	2.08	2.06	2.01	2.01	2.06	2.08	2.11	2.00
Steel Bars, Base, Philadelphia	2.12	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.22	2.27	2.27	2.22
Bar Iron, common base, Phila	2.12	2.12	2.12	2.12	2.12	2.07	2.07	2.12	2.12	2.12	2.22	2.17
No. 10 Blue Annealed Sheets, Phila	2.42	2.42	2.42	2.42	2.37	2.37	2.32	2.32	2.32	2.32	2.32	2.32
Billets, Open Hearth, Philadelphia	$38.30	$38.30	$38.30	$38.30	$38.30	$38.30	$37.30	$38.30	$38.30	$38.30	$38.30	$39.30
OLD MATERIAL												
†No. 1 Heavy Melting Steel	$14.00	$14.00	$13.75	$13.75	$13.75	$13.15	$12.75	$12.75	$14.65	$16.00	$15.90	$15.50
†No. 1 Railroad Wrought	15.25	15.25	15.25	15.25	15.25	15.25	15.25	14.80	15.10	15.50	15.50	15.50
†No. 1 Cupola Cast	16.75	16.75	16.75	16.25	16.25	16.00	16.00	15.75	16.20	17.00	16.50	16.50

†These prices apply to delivery at Eastern Pennsylvania consuming points other than Bethlehem.

Merchant Iron In Difficulties

Steelworks' Competition Sets Stiff Pace To Follow—Other Adverse Influences Lower Merchant Output as Well as Average Prices Realized—Quotational Recovery After August Buying Movement Points to Improved Conditions

THAT the way of the merchant pig iron producer is increasingly beset by difficulties was fully borne out by developments of 1928. He suffered increased participation in his market by steelworks furnaces. He saw levels quoted which at times were far below his production costs. He encountered an enlarged circle of reciprocal effort. Some merchant producers never could learn the exact requirements of certain consumers, because details of transactions were quietly worked out on the "three way" or "wheel-within-a-wheel" basis so that the open market inquiry could not be considered a criterion of that particular purchaser's buying effort since it never told the whole story. He witnessed an increased trend toward consumption of specialty irons in many directions and at times foreign iron was available at such cheap prices that his iron was omitted. Unless he combated these tendencies by lowering costs through furnace modernization and other methods, he was out of the competitive running entirely.

MONTHLY PIG IRON AVERAGES
By W. P. Snyder & Co.

	1928		1927	
	Bess.	Basic	Bess.	Basic
Jan.	$17.50	$17.00	$19.283	$18.25
Feb.	17.50	17.00	19.00	18.00
March	17.50	17.00	19.39	18.57
April	17.50	16.70	19.50	18.73
May	17.287	16.25	19.18	18.20
June	17.00	15.43	18.895	17.857
July	17.00	16.00	18.50	17.50
Aug.	17.00	16.00	18.31	17.25
Sept.	17.195	16.50	18.00	17.083
Oct.	17.528	17.28	18.00	17.00
Nov.	18.10	17.50	17.875	17.00
Dec.	.....	.....	17.56	17.00
1928				
11 mo. av.	17.37	16.61	.....	.....
1927				
12 mo. av.	.....	.....	18.62	17.70

Steady declines have been noted in average prices. This is demonstrated by the monthly compilations on bessemer and basic by W. P. Snyder & Co. The 1926 monthly average on bessemer was $19.55; 1927, $18.62 and 1928 (for 11 months) $17.37. For those three years, the basic averages stood at $18.53, $17.70 and $16.61, respectively. The accompanying comparative table for 1927 and 1928 shows the general trend of steelmaking iron prices for the two years. The fact that levels at the year's close generally were higher than when the year started is a source of encouragement and all signs point to improved conditions during 1929.

The Year's Range

	High	Low
No. 2 foundry, valley	$18.00	$16.50
Basic, valley	18.00	15.50
No. 2 foundry, Chicago	20.00	17.50

Merchant production has also been on the down grade. The monthly average for 1926 was 723,625 tons. For 1927 it was 697,861 and for 1928 (with December estimated) it was 603,114. As the scale descends for the merchant producer, it describes a corresponding ascent for the steelworks furnace, as is shown in the accompanying table of pig iron output.

Relatively high shipping rates were maintained throughout the year. September and October were the two largest shipping months. Of signal aid in this direction was the demand by automotive industries, which missed the usual summer letdown and enjoyed sustained operating rates during third quarter. In August the automotive industry's pig iron orders were the largest of any month since April, and September and October made similarly high records. In August likewise came a 25 per cent increase in the melt among sanitary ware foundries. Radiator and pipe foundries operated well throughout the year. Jobbing foundries, on the other hand, at times were down to 15 to 25 per cent, particularly in the first half. These also recovered during the third quarter.

The year witnessed two major buying movements, one in January, which really was a hangover from December, and the other in August. The latter successfully arrested the downward movement of prices. Toward the latter part of the year sales were fairly large for the first quarter of 1929.

Demonstrating the adverse effect which steelworks quotations had upon the price structure, when a consumer north of Pittsburgh entered the market in May, the basic market, which had declined $1 from the $17, valley, quotation obtained in January, was fairly firm at $16 to $16.50. Steelworks furnaces aggressively sought to book this tonnage (eventually aggregating approximately 60,000 tons) and made their price $17, delivered, creating a $15.35, valley, equivalent. That quotation, however, was not duplicated by other buyers and valley stacks shortly inaugurated a $15.75 minimum. The August buying movement took it higher and before the end of the year saw a restoration of the $17 price, with quotations of $17.50 to $18, valley, prevalent in December. Fluctuations in other grades were less radical.

Sales and shipments at Chicago eclipsed any previous year on record, even 1926, on shipments, and 1918 (the war year), on sales. Consumption was consistently high, automotive industries consuming 50 per cent of merchant production for the territory. Stocks, both furnace and melters', reached the lowest ebb in history by the year's close. Iron shipped by lake boat into Chicago was less than in 1927. The base prices remained at $18.50, Chicago furnace, until May 14, then dropping to $18, followed July 2 by another 50-cent recession, to $17.50, the lowest point since January, 1915. The $18 figure was reinstated Aug. 24, followed by two additional 50-cent advances, Sept. 14 and Oct. 16. A $1 advance to $20 was effective Oct. 29.

Similar recovery was noted in the East. The Philadelphia delivered price on No. 2X foundry was $20.51 in January and after rising and falling stood at $21.76 in December for prompt and at $22.25 for iron for delivery in the first quarter of 1929.

COKE PIG IRON PRODUCTION

Month	In blast last day	Merchant output	Non-merchant output	Total output
Jan.	184	649,654	2,205,861	2,855,515
Feb.	186	579,298	2,319,370	2,898,668
Mar.	196	597,106	2,602,069	3,199,175
Apr.	194	586,045	2,595,930	3,181,975
May	199	596,664	2,696,126	3,292,790
June	189	589,127	2,493,213	2,082,340
July	185	584,611	2,488,100	3,072,711
Aug.	183	563,510	2,573,485	3,137,995
Sept.	194	580,344	2,483,249	3,063,593
Oct.	196	643,043	2,730,496	3,373,539
Nov.	194	632,869	2,671,787	3,304,656
Dec.*	194	635,000	2,685,000	3,320,000
Total 1928†	.....	7,237,371	30,544,586	37,781,957
Mo. Ave....	.....	603,114	2,545,383	3,148,497
Total 1927	.....	8,374,333	27,976,571	36,350,904
Mo. Ave....	.....	697,861	2,331,381	3,029,242
Total 1926	.....	8,683,509	30,417,432	39,100,941
Mo. Ave....	.....	723,625	2,534,786	3,258,411

*Estimated.
†With December estimated.

Water transportation still continued somewhat of a factor in the eastern iron market. Much of the iron shipped by Buffalo furnaces to the East passed through the barge canal. Port Henry Troy and Mystic furnaces also shipped much tonnage by water to the eastern seaboard, as did the Chester, Pa., stack. Imports cut a smaller figure.

Beehive Coke Retrogression Is More Marked

ENCROACHMENT of by-product coke was felt increasingly by the beehive coke industry in 1928, and both production and consumption of the latter were further restricted. Through most of the year production of beehive compared with that of by-product coke was as one to ten. Beehive coke, like pig iron, spurted toward the end of the year. Beehive production reached a spring peak slightly in excess of 72,000 tons weekly, then eased off during the summer months but in the closing weeks of the year crossed the 100,000-ton weekly mark.

Blast furnace consumption of beehive continued along meager lines for practically nine months. Output for the most part was restricted to contractual obligations, most of which were automatically renewed. Some, however, took on special aspects, when exchange or reciprocal agreements were entered into between affiliated interests.

During October a number of supplemental purchases of behive coke by Jones & Laughlin, Bethlehem and other steel companies, to supplement their by-product supplies, rendered temporary market aid. Prices responded on the strength of this extra demand to the extent of 15 to 25 cents per ton, quotations of $2.90 and even $3, Connellsville, being reached. They quickly receded to $2.75 to $2.85, however, the figures which prevailed the major portion of the year, although some still lower prices, such as $2.60 and even

The Year's Range

	High	Low
Furnace, Connellsville..	$3.00	$2.50
Foundry, Connellsville...	3.75	3.50

$2.50 were encountered in June and July. The year closed with spot prices of $2.75 and $2.85 and a few contracts for first quarter, 1929, written or renewed at between $2.75 and $3.

Efforts of beehive coke producers to recoup their tonnage losses by quoting against extensive gas producer business were only partially successful. Some benefitted temporarily through spot market purchases by gas companies while fuel tests were being made.

Some of these inquiries, including that of the United Gas Improvement Co., involved as much as 300,000 tons at a time, but owing to the aggressiveness of by-product makers, only a few were placed with beehive oven operators. Such contracts usually run for a year and the latter were unwilling to put on more ovens except at a profit and this represented prices above those the by-product people were willing to accept. One or two arrangements for beehive were made with special price considerations involved.

Some coal and coke producers practically stepped out of the coke business to concentrate upon coal. While coal prices during much of the year were highly unsatisfactory from their standpoint, the opening of the lake season brought returns on northwestern shipments equivalent to $3.50, Connellsville, for coke. The so-called outlaw coal miners' strike in the Connellsville fields as of April 1 proved ineffectual. On July 1 the H. C. Frick Coke Co. inaugurated its first wage rate revision since 1922, a cut averaging 11 per cent.

Foundry consumption of beehive oven fuel was meager. Sanitary ware, radiator and cast iron pipe foundries operated well most of the year and consistently accepted their coke quotas. Jobbing foundry operation descended to as low as 20 per cent, especially in the summer. While some beehive foundry sold at $3.50 and even $3.25, the better grades brought $3.75 to $4.75 and a few premium brands commanded still higher levels, $4.85 to $5.25. During April the tendency among many foundries to buy cheaper grades was more marked as they attempted to reduce production costs and enter increasingly into the competitive castings market. For the most part, however, foundries remain affiliated with their long-time sources of supply.

In the East, by-product foundry fuel remained unchanged all year at $8.30, Seaboard, N. J., ovens. Detroit by-product foundry fuel also stood for the 12 months practically stationary at $8.50, ovens, for local delivery or $9, f.o.b. Detroit, for outside shipments. Other sections also reported stationary markets.

Automotive Influence Expands Semifinished

HIGH rates of operation were possible most of 1928 by many semifinished steel makers and users. Some mills enjoyed practically 100 per cent schedules for 10 or 11 months. Numerous buyers resumed their practice of purchasing quarterly, largely dispensed with in 1927. During the summer lull, more spot buying took place, but in third and fourth quarters covering for more extended periods became much more in evidence. Generally, however, the purchasing of billets, slabs and sheet bars seems to be resolving itself into quiet negotiations. During the past year, additional mergers took several plants out of the market permanently, a case in point being

The Year's Range

	High	Low
Sheet bars	$34.00	$32.00
Open Hearth billets	33.00	32.00
Wire rods	44.00	40.00
Skelp	1.90c	1.75c

that of the Trumbull Steel Co., absorbed by Republic Iron & Steel Co.

Demand for sheets and strip steel by the automotive industry's largest consumers created almost unprecedented tonnages, particularly in August and September, months hitherto slow. This aided recovery from a slump in the second quarter, due mostly to consumers bringing pressure for price concessions similar to those obtainable in basic pig iron.

While early in the year sheet bars occupied their usual position, $1 per ton above billets and slabs, the end of first quarter and during a portion of the second, they declined sometimes as much as $1.50. This was attributable to competitive conditions prevailing when a Northern Ohio mill seeking to sustain a 100 per cent schedule absorbed freight charges. Sheet bars assumed their usual place in advance of billets by the end of the year when first quarter, 1929, contracting began, with $34, Pittsburgh and Youngstown, quoted, the same price at which the year started. During second quarter, quotations on billets, slabs and sheet

bars were as mixed as in a long period. They gradually righted themselves on unexpected tonnage developed in the third and fourth quarters with orders in excess of capacity. During October business so improved that a Cleveland mill unable to supply its ingot and sheet bar needs in Cleveland placed several thousand tons with a Youngstown interest and paid the full price, then $33, Youngstown.

Excellent automotive demand was transferred to producers of forging billets. This grade did not reflect some of the low figures which appeared on billets but remained practically stationary at $38, Pittsburgh, all year. Some drop forge shops have orders which will keep them active at full capacity well through 1929.

Expansion in demand for wire rods outside of the wire drawing industry reached new heights. Wire rods stayed at $42, Pittsburgh, practically all year. Attempts to get $44 availed little, the increase to that figure Jan. 26 having practically disappeared by July 6, with few sales.

Skelp prices fluctuated but demand was well sustained. Skelp received its main support from gas and oil pipe lines awarded to Pittsburgh, Youngstown and Milwaukee pipe producers for installation in the West and Southwest. Skelp was quoted at 1.80c, Pittsburgh, at the year's start, rose gradually by July-August to 1.95c, when some quoted 2.00c on fourth quarter contracts, but declined to 1.85c to 1.90c in the closing quarter.

Gas Line Tonnages Aid Pipe Mill Output

INTERMITTENT pipe line purchases, more numerous for gas than for oil, were a development of the tubular products market during 1928, particularly in the early last half. While buttweld mill operations dropped to 40 per cent or less, lapweld mill operations averaged 70 per cent or higher during that period. These large orders by gas companies furnished backlogs when they most were needed to make up for the lack of merchant pipe, oil country goods, casing, etc. Several lines involved 25,000 to 75,000 tons and a few called for larger lots. One comprising 100,000 tons was placed with a Youngstown, O., maker for a petroleum line to Gulfport, Tex. Another of similar size were placed with a Milwaukee producer for a gas line from Amarillo, Tex., to Kansas City. Several other lines were awarded the latter maker, which bends skelp cold for electric welding, including a 72,000-ton line in November. The largest inquiry of the year came from the Standard Oil Co. of New Jersey for 150,000 tons of 22 and 24-inch, for a line from Monroe, La., to St. Louis.

Seamless casing for oil wells met increasing favor on the part of drillers. Seamless tubing orders from automobile, airplane and other industries were fairly steady. The last half witnessed a measurable increase in tonnage over the first half.

Merchant pipe languished although in the spring and fall spurts of good business were enjoyed, due to the working out of splendid building programs in various sections of the country. Jobbers maintained their policy of buying in small lots and carrying low inventories. Mills on the other hand were forced to carry consistently large stocks to supply jobber demands for deliveries as needs arose. Numerous large buildings accounted for 250 to 300 tons each of pipe and conduit at a time.

No changes took place in the pipe card but on April 2 producers removed the extra 5 per cent discount they had been granting their jobber customers since the final quarter of 1927. The latter were given an opportunity to book one month's quota of business before the advance was applied but the tonnage thus obligated had to be taken out prior to April 30.

Changes in Discounts on Steel Pipe

Jobbers, Carloads, Base, Pittsburgh

	Sizes in inches	Butt Weld Basing Black	Butt Weld Discount Galv.
Jan. 1, 1910 to Oct. 1, 1910	½ to 6	78	68
Oct. 1, 1910 to Oct. 2, 1911	2 to 3	80	70
Oct. 2, 1911 to Dec. 1, 1911	2 to 3	81	74
Dec. 1, 1911 to Dec. 15, 1911	2 to 3	83	76
Dec. 15, 1911 to Jan. 1, 1912	2 to 3	83	76
Jan. 1, 1912 to July 1, 1912	2 to 3	82	75
July 1, 1912 to July 24, 1912	2 to 3	82	75
July 24, 1912 to Sept. 10, 1912	2 to 3	81	74
Sept. 10, 1912 to Jan. 1, 1913	2 to 3	80	72
Jan. 1, 1913 to April 12, 1913	¾ to 3	80	71½
April 12, 1913 to May 27, 1913	¾ to 3	79½	71
May 27, 1913 to Aug. 8, 1913	¾ to 3	79	70½
Aug. 8, 1913 to Oct. 27, 1913	¾ to 3	80	71½
Oct. 27, 1913 to Feb. 2, 1914	¾ to 3	80	71½
Feb. 2, 1914 to April 20, 1914	¾ to 3	79½	71
April 20, 1914 to Nov. 2, 1914	¾ to 3	80	71½
Nov. 2, 1914 to Feb. 11, 1915	¾ to 3	82	72½
Feb. 11, 1915 to May 1, 1915	¾ to 3	80	69½
May 1, 1915 to June 11, 1915	¾ to 3	79	68½
June 1, 1915 to June 17, 1915	¾ to 3	79	63½
June 17, 1915 to Aug. 5, 1915	¾ to 3	79	57½
Aug. 15, 1915 to Nov. 1, 1915	¾ to 3	79	63½
Nov. 1, 1915 to Jan. 4, 1916	¾ to 3	78	63½
Jan. 4, 1916 to Jan. 20, 1916	¾ to 3	77	62½
Jan. 20, 1916 to Feb. 15, 1916	¾ to 3	76	60½
Feb. 15, 1916 to Feb. 29, 1916	¾ to 3	75	59½
Feb. 29, 1916 to Mar. 15, 1916	¾ to 3	74	57½
Mar. 15, 1916 to Mar. 29, 1916	¾ to 3	73	55½
Mar. 29, 1916 to April 21, 1916	¾ to 3	72	53½
April 21, 1916 to July 24, 1916	¾ to 3	70	50½
July 24, 1916 to Sept. 7, 1916	¾ to 3	70	55½
Sept. 7, 1916 to Nov. 1, 1916	¾ to 3	69	55½
Nov. 1, 1916 to Nov. 15, 1916	¾ to 3	69	55½
Nov. 15, 1916 to Dec. 4, 1916	¾ to 3	68	54½
Dec. 4, 1916 to Dec. 30, 1916	¾ to 3	66	52½
Dec. 30, 1916 to Feb. 14, 1917	¾ to 3	64	56½
Feb. 14, 1917 to Mar. 5, 1917	¾ to 3	62	48½
Mar. 5, 1917 to April 2, 1917	¾ to 3	60	46½
April 2, 1917 to Nov. 6, 1917	¾ to 3	55	41½
Nov. 6, 1917 to Jan. 1, 1919	¾ to 3	51	37½
Jan. 1, 1919 to Mar. 21, 1919	¾ to 3	54	40½
*Mar. 21, 1919 to April 13, 1921	¾ to 3	57½	44
April 13, 1921 to July 7, 1921	1 to 3	62½	50
July 7, 1921 to Sept. 16, 1921	1 to 3	64½	52
Sept. 16, 1921 to Dec. 15, 1921	1 to 3	68½	56
Dec. 15, 1921 to Aug. 17, 1922	1 to 3	71	58½
Aug. 17, 1922 to Oct. 19, 1922	1 to 3	68	56½
Oct. 19, 1922 to Feb. 13, 1923	1 to 3	66	54½
Feb. 13, 1923 to April 19, 1923	1 to 3	64	52½
‡April 19, 1923 to date†	1 to 3	62	50½

*Level adopted by independent companies Dec. 31, 1920.

‡Since Sept. 21, 1924, Pittsburgh and Lorain basing discounts, jobbers' carloads, Evanston, Ill., and Indiana Harbor, Ind., take differential 2 points less discount or $4 per ton higher net. Chicago takes differential 2½ points less than Pittsburgh-Lorain basis or $5 per ton higher net.

†In final quarter of 1927 an extra 5 per cent was granted to jobbers. This was removed April 2, 1928.

Composite Market Record

Compiled by Iron Trade Review

Monthly Averages of Fourteen Iron and Steel Products, 1917-1924

1917	
January	$55.10
February	56.76
March	61.07
April	66.48
May	73.96
June	82.66
July	89.56
August	89.69
September	83.18
October	67.75
November	58.29
December	56.68
Average for year	70.10

1918	
January	56.67
February	56.67
March	56.71
April	56.59
May	56.59
June	56.62
July	56.66
August	$56.67
September	56.56
October	57.53
November	55.67
December	57.24
Average for year	56.68

1919	
January	53.81
February	53.71
March	52.28
April	48.45
May	48.29
June	47.88
July	47.86
August	48.27
September	48.35
October	48.76
November	51.28
December	54.88
Average for year	50.32

1920	
January	59.40
February	65.63
March	$65.47
April	67.49
May	68.26
June	67.89
July	68.29
August	68.93
September	69.28
October	68.61
November	63.75
December	54.04
Average for year	65.59

1921	
January	51.98
February	48.81
March	45.37
April	43.84
May	43.32
June	41.87
July	38.14
August	35.99
September	35.34
October	35.46
November	34.71
December	$33.99
Average for year	40.74

1922	
January	33.35
February	32.86
March	32.97
April	34.42
May	36.49
June	36.96
July	37.50
August	39.79
September	43.79
October	43.60
November	42.08
December	40.53
Average for year	38.76

1923	
January	41.17
February	42.61
March	45.31
April	47.01
May	$47.52
June	46.46
July	45.39
August	44.87
September	44.64
October	43.84
November	42.81
December	43.02
Average for year	44.55

1924	
January	43.26
February	43.49
March	43.24
April	42.33
May	41.38
June	40.61
July	39.78
August	39.33
September	39.05
October	38.65
November	39.00
December	40.21
Average for year	40.86

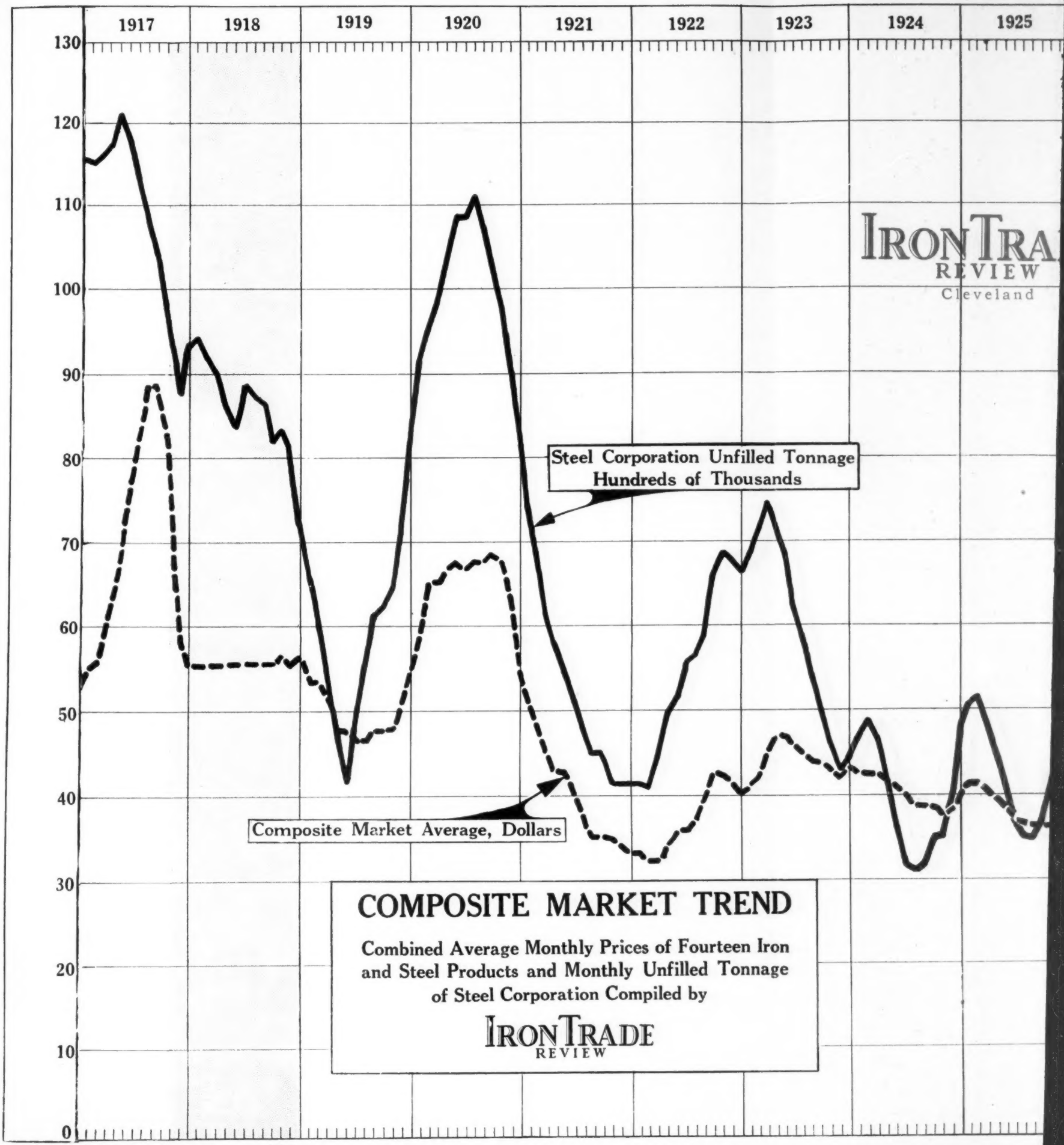
Weekly and Monthly Averages, 1925-1928

1925	
Jan. 7	$40.92
Jan. 14	41.05
Jan. 21	41.00
Jan. 28	41.00
Average for January	41.02
Feb. 4	41.22
Feb. 11	41.22
Feb. 18	41.06
Feb. 25	41.02
Average for February	41.13
Mar. 4	41.02
Mar. 11	40.83
Mar. 18	40.63
Mar. 25	40.33
Average for March	40.70
April 1	40.22
April 8	39.69
April 15	39.43
April 22	39.05
April 29	38.85
Average for April	39.45
May 6	38.75
May 13	38.49
May 20	38.21
May 27	38.04
Average for May	38.37
June 3	38.01
June 10	37.65
June 17	37.43
June 24	37.33
Average for June	37.60
July 1	37.45
July 8	37.45
July 15	37.45
July 22	37.45
July 29	37.45
Average for July	37.45
Aug. 5	37.43
Aug. 12	37.45
Aug. 19	37.45
Aug. 26	37.21
Average for August	37.39
Sept. 2	37.21
Sept. 9	37.35
Sept. 16	37.35
Sept. 23	37.40
Sept. 30	37.42
Average for September	37.35
Oct. 7	37.43
Oct. 14	37.43
Oct. 21	37.61
Oct. 28	37.95
Average for October	37.61
Nov. 4	38.44
Nov. 11	38.76
Nov. 18	38.84
Nov. 25	38.89
Average for November	38.73
Dec. 2	39.17
Dec. 9	39.10
Dec. 16	39.10
Dec. 23	39.10
Dec. 30	39.24
Average for December	39.14

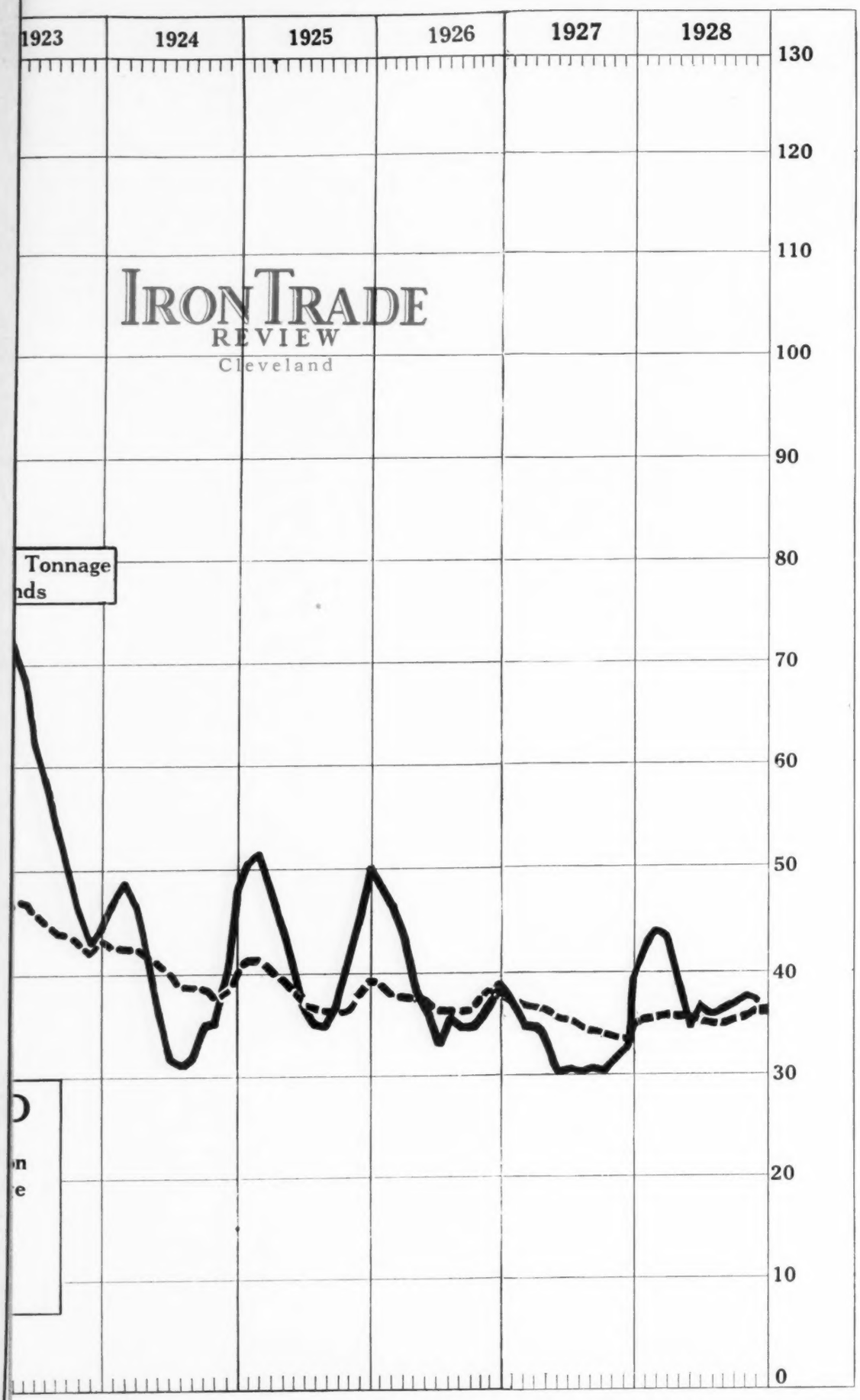
1926	
Jan. 6	$39.26
Jan. 13	39.26
Jan. 20	39.15
Jan. 27	39.01
Average for January	39.17
Feb. 3	39.00
Feb. 10	38.98
Feb. 17	38.90
Feb. 24	38.90
Average for Feb.	38.95
Mar. 3	38.90
Mar. 10	38.90
Mar. 17	38.85
Mar. 24	38.89
Mar. 31	38.86
Average for March	38.88
April 7	38.54
April 14	38.53
April 21	38.47
April 28	38.39
Average for April	38.48
May 5	38.39
May 12	38.34
May 19	38.14
May 26	38.00
Average for May	38.22
June 2	37.84
June 9	37.68
June 16	37.60
June 23	37.58
June 30	37.74
Average for June	37.69
July 7	37.74
July 14	37.69
July 21	37.67
July 28	37.61
Average for July	37.68
Aug. 4	37.61
Aug. 11	37.61
Aug. 18	37.61
Aug. 25	37.61
Average for August	37.61
Sept. 1	37.58
Sept. 8	37.76
Sept. 15	37.78
Sept. 22	37.86
Sept. 29	37.82
Average for September	37.76
Oct. 6	37.85
Oct. 13	38.13
Oct. 20	38.14
Oct. 27	38.18
Average for October	38.08
Nov. 3	38.30
Nov. 10	38.43
Nov. 17	38.47
Nov. 24	38.50
Average for November	38.43
Dec. 1	38.46
Dec. 8	38.24
Dec. 15	38.22
Dec. 22	38.12
Dec. 29	38.08
Average for December	38.22

1927	
Jan. 5	$38.06
Jan. 12	37.78
Jan. 19	37.47
Jan. 26	37.38
Average for January	37.68
Feb. 2	37.32
Feb. 9	37.06
Feb. 16	36.75
Feb. 23	36.75
Average for February	36.97
Mar. 2	36.75
Mar. 9	36.79
Mar. 16	36.87
Mar. 23	36.87
Mar. 30	36.89
Average for March	36.83
April 6	36.81
April 13	36.81
April 20	36.64
April 27	36.64
Average for April	36.73
May 4	36.70
May 11	36.85
May 18	36.82
May 25	36.66
Average for May	36.76
June 1	36.40
June 8	36.72
June 15	36.70
June 22	36.65
June 29	36.50
Average for June	36.59
July 6	36.49
July 13	36.38
July 20	36.40
July 27	36.36
Average for July	36.41
Aug. 3	36.26
Aug. 10	36.24
Aug. 17	36.23
Aug. 24	36.23
Aug. 31	36.27
Average for August	36.25
Sept. 7	36.27
Sept. 14	36.25
Sept. 21	36.10
Sept. 28	36.09
Average for September	36.18
Oct. 5	36.05
Oct. 12	35.55
Oct. 19	35.55
Oct. 26	35.51
Average for October	35.67
Nov. 2	35.51
Nov. 9	35.45
Nov. 16	35.36
Nov. 23	35.24
Nov. 30	35.17
Average for November	35.35
Dec. 7	35.10
Dec. 14	35.09
Dec. 21	35.09
Dec. 28	35.07
Average for December	35.09

1928	
Jan. 4	$35.07
Jan. 11	35.23
Jan. 18	35.33
Jan. 25	35.45
Average for January	35.27
Feb. 1	35.45
Feb. 8	35.61
Feb. 15	35.61
Feb. 22	35.61
Feb. 29	35.83
Average for February	35.62
Mar. 7	35.91
Mar. 14	35.91
Mar. 21	35.70
Mar. 28	35.71
Average for March	35.81
April 4	35.77
April 11	35.77
April 18	35.56
April 25	35.56
Average for April	35.67
May 2	35.56
May 9	35.57
May 16	35.53
May 23	35.53
May 30	35.50
Average for May	35.54
June 6	35.46
June 13	35.48
June 20	35.20
June 27	35.05
Average for June	35.30
July 4	34.93
July 11	34.85
July 18	34.89
July 25	34.97
Average for July	34.91
Aug. 1	34.93
Aug. 8	34.89
Aug. 15	34.89
Aug. 22	35.01
Aug. 29	35.10
Average for August	34.96
Sept. 5	35.11
Sept. 12	35.13
Sept. 19	35.23
Sept. 26	35.29
Average for September	35.19
Oct. 3	35.30
Oct. 10	35.42
Oct. 17	35.57
Oct. 24	35.63
Oct. 31	35.73
Average for October	35.53
Nov. 7	35.81
Nov. 14	35.93
Nov. 21	36.19
Nov. 28	36.13
Average for November	36.02
Dec. 5	36.16
Dec. 12	36.24



Supplement to IRON TRADE REVIEW, Jan. 3, 1929 Issue.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Heavy Melt Buoys Steel Scrap

Steady Consumption in Several Grades Makes Tonnage Record—Accumulations Swept from Many Yards—High Grade Material Brings Premium Prices—Direct Buying by Melters Gains Volume

STEADY consumption, which was a record for several grades, characterized the iron and steel scrap market. Actual scarcities of some grades of scrap material, sweeping yards clean of stocks of as much as eight years' accumulation, developed late in 1928 as prices took a generally steady upward turn from early in August. The close of the year found most yards almost barren of prepared scrap.

In the Chicago district consumption of heavy melting steel and cast borings made a record, surpassing war years. Forge flashings and hydraulic compressed sheets supplemented heavy melting steel to a larger extent than heretofore.

The uniformly high rate of steelworks operations created vigorous demand, and except for a brief midsummer dip consumption remained unusually steady. In the East the advance for heavy melting steel was approximately $4.50 during last half. In the West the upward trend was more moderate at about $1.50. A marked shortage in electric furnace grades developed in the West from reduced operations of car building shops and other producers, while consumption was increased by three additional electric furnaces in the Chicago district.

The Year's Range	High	Low
Heavy melting, Pittsburgh	$17.75	$14.00
Heavy melting, Chicago	14.50	12.25
Heavy melting, eastern Pa.	16.00	12.75

The average heavy melting steel price for all important consuming points in 11 months of 1928 was 85 to 90 cents higher than in the preceding year. The average price of cast borings was $1 a ton above 1927 in the Chicago district. Large consumers of borings bought steadily against intermittent buying in previous years.

Scarcities also developed in short rails and angle bars. In the West short rails jumped from $15.50 to a peak of $19 during the late summer rise and angle bars advanced from $13.75 to $17. A noticeable shift in demand was shown from short rails of three feet and under to more liberal buying of rails two feet and under. This was due in part to the heavier rails now used more generally, which produce rail scrap of greater weight per unit.

In the Pittsburgh district large steelworks consumers bought more freely direct from railroads. The lists of railroads offering high grade scrap brought higher prices from consumers than they had indicated they would pay for dealer accumulations. Some steelworks melters, seeking to make steel ingot production records, were unwilling to take chances on yard scrap. Railroad offerings generally brought higher prices than prevailing market quotations. Scrap grades became scarce in the Chicago district in June and July partly because country scrap in the tributary territory was absorbed by eastern markets. Much Detroit scrap also was diverted from the Chicago district because of lower prices there than in the East.

Cast and malleable foundry grades, in contrast with steelworks scrap, moved less actively. Cupola cast started at fairly high quotations in the Pittsburgh district, but soon lost ground, and remained at a low level while heavy melting steel reached as high as $18.25 in the Pittsburgh district, $16 at Philadelphia and $15 at Chicago.

Large Buying Feature in Coal By-Products

EXCEPTIONALLY heavy demand for toluol during the closing six months featured the coal tar by-products market in 1928. This activity was due largely to buying by the lacquer industry, which became hard pressed in keeping up with requirements, particularly of automobile manufacturers. Late in October distributors announced a 5-cent increase in an effort to stimulate production. As considerable new equipment had to be purchased, production, as expected, was slow in expanding, but distributors are confident the desired increased will become more pronounced this year.

The Year's Range	High	Low
Benzol	$0.23	$0.215
Toluol	0.40	0.35
Sulphate ammonia	2.35	2.20

Scarcity of toluol brought an improved demand from lacquer manufacturers for commercial xylol for use as a substitute. Solvent naphtha also was affected, but in a lesser degree. Increased buying of benzols and an accompanying slight advance in benzol prices was notable in the closing

Coal Tar Products Market in 1928

F.o.b. Producers' Works

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Benzol	$0.23	$0.23	$0.22	$0.22	$0.22	$0.215	$0.22	$0.22	$0.22	$0.225	$0.23	$0.23
Toluol	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.3625	0.40	0.40
Solvent naphtha	0.35	0.35	0.325	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Phenol	0.195	0.195	0.19	0.18	0.175	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Naphthalene flakes	0.055	0.05	0.0525	0.0575	0.06	0.0625	0.065	0.065	0.065	0.065	0.055	0.055
Naphthalene balls	0.065	0.06	0.0625	0.0675	0.07	0.0725	0.065	0.065	0.065	0.065	0.055	0.055
*Sulphate of ammonia	2.325	2.325	2.35	2.35	2.35	2.20	2.20	2.20	2.20	2.30	2.30	2.30

*Delivered basis.

months. Industrial demand, particularly from tire manufacturers, picked up sharply and there was better buying of motor fuel, which affected this product. A sharp improvement was noted in European demand for benzol for motor fuel purposes, with England a particularly good purchaser.

Light toluol distillate prices generally were steady. In the early summer the benzol market became easy and there was a somewhat softer tone at that time in commercial xylol and solvent naphtha, but this was later offset by strength.

Tin Mill Output Approaches Record of 1926

DESPITE the fact that many 1928 vegetable packs fell short of expectations, tin plate production was remarkably high. The three staple packs—corn, peas and tomatoes—aggregated only 42,900,000 cases against 46,250,000 cases in 1927. The pea crop was the second largest in history, but tomatoes were subnormal. While the salmon pack was large, as were the California and Hawaiian fruit packs, others fell down. Extreme heat in August interfered with efficiency of mill crews. Notwithstanding these adverse influences, a conservative estimate of the 1928 tin plate output (including black plate), is 42,000,000 base boxes or 2,100,000 net tons, which closely approaches high record set in 1926.

Of aid last year in maintaining demand was an excellent export market. British prices were higher, enabling American producers at times to realize as much as 15 cents per box more than formerly. Japan took large tonnages for oil. Other countries increased their orders. Exports of condensed milk, evaporated cream and other packed products showed a consistent increase.

Most of the year tin plate shipments were evenly divided between general line and packers' containers. While no particularly new adaptations were made, the consumption of general line cans mounted.

While no new tin mill capacity was added during the year, the American Sheet & Tin Plate Co. marketed its No. 48-gage paper-thin plate.

The year started with $5.25 per base box, Pittsburgh, as the published price, which had prevailed throughout 1927. Price cutting was sharp at times. In November a $2 advance was inaugurated with the announcement of $5.35 for first half, 1929. The 2 per cent cash discount was retained.

While in January operations averaged 75 per cent, from March until August and in some cases September, practically full schedules were possible. The fall lull set in a month or so late, in late October. Customers favored mills where they could with anticipative specifications.

Unbalanced Demand Holds Back Wire Trade

MARKETING of wire products met unbalanced demand during 1928. Production and sales measured well with previous years in several products. Finishing mills fell behind 1927 in distribution. Manufacturers' wire was active.

While farm buying power increased in most sections, this was not reflected in a higher volume of sales in agricultural wire, which was under 1927.

Mill production in the West was more uniformly sustained than with eastern wire mills. Western mills kept close to 65 per cent of capacity most of the year, and reached 70 and 75 per cent for brief periods. In eastern territory, wire and nail finishing mills operated under 60 per cent.

The Year's Range

	High	Low
Nails, Pittsburgh	2.65c	2.55c
Wire, Pittsburgh	2.50c	2.35c

The year started with 2.40c, base Pittsburgh-Cleveland, on plain wire and $2.55 on wire nails. Late in January, the leading producer advanced $2 a ton, which was followed indifferently by the independents who were meeting with stiff jobber competition. Poor returns were realized on second quarter contracts priced at 2.55c and $2.65 for wire and nails, respectively, so that by early spring some makers were extending their customers through the quarter at the old bases. Late in the second quarter the leading interest led in re-establishing 2.40c and $2.55 levels. In some cases this was an advance instead of a reduction, because the market had declined to such a low point on a competitive basis. In the West the $1 a ton differential over Pittsburgh-Cleveland was fairly well maintained, although prices went to the Pittsburgh-Cleveland basis in sales by Indiana mills, and concessions were made in the Northwest.

Most makers Dec. 7 adopted a new basis of quoting, to the trade instead of the jobber, the net effect being a rise of $2 per ton for first quarter of 1929.

New Construction Swells Refractory Total

ROUTINE purchases for repair purposes chiefly characterized the refractory market in 1928 as in 1927. However, occasional new construction items offered contrasts. These developed mainly during the first half, when open-hearth construction by such companies as Timken Roller Bearing Co., Otis Steel Co., American Rolling Mill Co., Weirton Steel Co. and Ford Motor Co., stood out. Blast furnace installations were more rare, among others placed being that of the Jones & Laughlin Steel Corp. Blast furnace stove lining orders were more frequent. By-product coke oven installations by the Youngstown Sheet & Tube Co., Koppers Co. and others accounted for large quantities and a Pittsburgh district kiln operator made an export shipment in November of 1,500,000 brick.

Kiln operation was low during first half, sometimes as low as 25 or 35 per cent. More efficient use of furnace equipment, and improvement of the quality of furnace linings tended to restrict consumption. With general improvement in business during last half, requirements expanded and shipments by 80 or 85 per cent of the producers gained somewhat over 1927.

Users continued their practice of putting the burden of stock-carrying upon the producers. These, because of the diversity of shapes, had to carry larger inventories than ever.

Prices, except for intermittent cutting, held at practically unchanged figures all year. Pennsylvania No. 1 fire clay was quoted at $43 to $46, silica at $43, chrome at $45, magnesite at $65. The latter two grades enjoyed increasingly widespread use.

Shape Tonnage in New Record

Second Consecutive Year Higher Mark Has Been Set in Structural Tonnage—Shipments Also Likely To Exceed High Mark of 1926—Unusual Number of Large Projects Materialized During Year

FOR the second consecutive year structural bookings established a record in 1928. Even estimating the closing two months' business conservatively, there appears little doubt that orders will substantially exceed the 3,063,500-ton total of 1927.

Shipments also may exceed the banner record of 1926. According to the department of commerce, shipments for the first 10 months were 2,625,000, or less than 100,000 tons under the total for the corresponding period of two years ago. With fabricating shops in most districts operating at a high rate during the closing months this difference may be more than offset. Shipments of 330,000 tons in October made the highest monthly total ever recorded. Notwithstanding record business, capacity still appeared ample and there was little congestion at mills or fabricating shops.

Prices improved in most sections, but the situation was irregular through most of the year. Competition among fabricating shops was particularly keen. In two leading centers, no real evidences of strength were manifested until the last quarter; and, in the main, this situation was true of shape prices.

At Pittsburgh, shape prices started the year at 1.80c, and while early advances were announced they met stubborn resistance, and it was not until fourth quarter that a range of 1.90c to 2.00c appeared firmly established. At Chicago, mills allowed 1.90c to 1.95c, Chicago, contracts to be extended well up to fourth quarter,

The Year's Range	High	Low
Shapes, Pittsburgh	1.95c	1.80c

when prices of 2.00c to 2.10c became the rule. Incidentally, eastern mills competed in Chicago district to a larger extent than heretofore, one lower lake mill maintaining regular weekly lake boat schedules to Chicago and Milwaukee.

In the East, price irregularities were more apparent than in most other districts. While the New York market opened at 2.095c, New York, to close the year at around 2.195c on the general run of business, the Philadelphia market opened at 2.08c, Philadelphia, to close at slightly less.

The continued tendency toward larger projects and the use of larger and heavier sections was pronounced. Notable was the use of 33 and 36-inch girders and 16-inch columns, and this general trend has made certain inroads into the application of plates in the heavier building work.

A leading development was the marketing of a new line of special sections by the principal producer. This narrowed competition with the leading independent, and made easier a shift in the design of a project than was otherwise possible where only the standard shapes and the special sections of the independent were considered. However, the two lines varied sufficiently to impose upon many jobbers the necessity for carrying much larger stocks of structurals. At present patent litigation is pending between the two principal sellers as a result of the marketing of this latest line of special shapes.

The tendency toward larger projects is demonstrated by the fact that of awards listed by IRON TRADE REVIEW during the past year more than 15 involved 15,000 tons or over, and close to 25 involved 10,000 tons or over. Projects requiring 5000 tons and upward were numerous. The two largest projects involved 60,000 tons for the Chicago Merchandise Mart and 57,800 tons for the Cleveland Union Terminals Co.

Miscellaneous bridgework is said by trade leaders to have gained approximately 25 per cent over the preceding year. A leading bridge award in 1928 involved 26,500 tons for a New York city project.

Industrial work showed further gains. Probably the biggest consumers were the primary producers of iron and steel.

Following is a comparative statement of structural bookings compiled by the department of commerce:

	1928	1927	1926	1925
Jan.	210,000	195,000	208,800	187,380
Feb.	266,250	243,750	208,800	194,320
Mar.	258,750	232,500	234,000	225,500
Apr.	236,250	262,500	252,000	256,780
May	311,250	232,500	266,400	229,020
June	303,750	228,750	262,800	284,540
July	296,250	345,000	248,400	274,130
Aug.	356,250	243,750	284,400	267,190
Sept.	318,750	266,250	216,000	270,660
Oct.	240,000	288,750	230,400	298,420
Nov.	*225,000	236,250	223,200	239,430
Dec.	*225,000	262,500	255,300	253,310
Total	3,247,500	3,063,500	2,890,800	2,980,730

*Estimated.

Steady Buying and Broader Use Aid Bar Mills

UNUSUAL steadiness in buying of bar mill products and broader use of soft steel bars were features of the bar market during 1928. Short range buying prevailed but the quantity lump sum differentials for lots of 4000 pounds and under, in effect for more than a year, eliminated much odd-lot ordering from mills.

Producers were successful in strengthening prices late in the year. Owing to continued high operating costs, however, profits were not considered commensurate with the steady

The Year's Range	High	Low
Bars, Pittsburgh	1.95c	1.80c

volume of tonnage. Peaks and dips in buying were leveled, and consumption was more uniform than previously.

Automotive demand buttressed the merchant bar market in the Pittsburgh district. Changing of car models in midsummer and in November brought slackened activity. In the West automotive demand and the striking rate of consumption by farm implement and tractor works led the market. Implement and tractor demand was fully 30 per cent ahead of 1927, setting a new record for ten years.

Specifications for bar mill products in the West made a record. As for several years, soft steel and other bars accounted for about half of the output of heavy finished steel at Chicago. Mill orders in the first nine months in the Chicago district ran 20 per cent ahead of 1927, and were at least 10 per cent ahead of the previous

record, which was achieved in 1926.

Despite more uniform buying and steadier production, bar mill capacity continued above requirements. While bar capacity is in fewer hands than for most other finished products, it is sufficiently extensive that even in the peak demand 35 to 40 per cent of bar mill capacity was idle. Bar mill operations held their highest level in the West. At no time in the Chicago district did mills fall below 75 per cent. During the record activity in March and April, operations reached 90 per cent. In early October Chicago district bar bills were operating at practical capacity.

Mills started with heavy bar specifications against 1.80c, Pittsburgh, contracts. The Carnegie Steel Co.'s advance to 1.85c Jan. 19 soon was adopted generally, and specifications were driven in on lower priced contracts. Again the Carnegie company took the lead and Feb. 22 made effective a further $1 advance, to 1.90c. These stimulated specifications on earlier contracts. When it appeared that larger tonnage users had been given contracts at 1.85c, pressure was brought to bear for a readjustment. Sales resistance became stronger during the summer, and while 1.90c was announced for third quarter, coverage at levels down to $1 a ton below that price was fairly extensive. For fourth quarter an attempt was made to establish $2 a ton higher, with some success. Efforts of eastern mills to strengthen the market stimulated a determination for western mills to hold the market at 2.00c. While the July 16 announcement mentioned 2.00c, Pittsburgh, as the fourth quarter price, this was for small lots. Large tonnage buyers paid 1.90c but many miscellaneous buyers bought at 1.95c. Late in November, large independents announced continuance of those levels for first quarter, 1.90c applying on sales of 1000 tons or more a quarter.

Satisfactory Year Enjoyed by Platemakers

PLATE mills experienced in 1928 the most satisfactory conditions since the war. Consumption was at a good rate all year, reaching its peaks in the spring and early fall. At the latter time many mills were operating 85 to 90 per cent, some with small backlogs. Most plate orders involved small lots for immediate shipment. Because of higher prices, greater and more sustained volume and lowering of mill costs, earnings of plate mills in 1928 improved moderately.

Expansion of traffic on inland waterways absorbed tonnages of plates. Large orders for barges were placed in connection with flood relief work, and there were many orders for barges and towboats.

Requirements of oil storage tanks set a new record from which Chicago mills particularly benefitted. Pipe lines absorbed a greatly increased tonnage. A gas line from Louisiana to Kansas City took 114,000 tons of plates, and an oil line from Texas to Nebraska upward of 100,000 tons. The end of the year was featured by an inquiry for a 40,000-ton water line in New Jersey.

The Year's Range	High	Low
Plates, Pittsburgh	1.95c	1.80c

The revival in shipbuilding aided plate business in the latter part of 1928, with additional important shipbuilding projects pending. Plate mills have benefitted from recent developments in welding, as numerous uses of plates are made thus possible.

The tendency at some plate mills to fabricate plate products is somewhat more pronounced. One mill now fabricates plates and shapes into completed structural members. Certain eastern mills regard fabrication as an important adjunct to their business, fabricating in whole or in part for customers who use the fabricated plates in the manufacture of their ultimate products. Development of larger structural shapes has cut down the use of plates for structural purposes because of the elimination of many built-up sections.

Plate production has been increased to a slight extent on the Pacific coast, but that section still obtains most of its requirements from the East and Middle West. Wide strip to some extent has become competitive with thin plates.

The year started with 1.80c, base, Pittsburgh, and closed at 1.90c to 2.00c, subject to concessions for preferential buyers. Eastern mills obtained f.o.b. Coatesville prices, substantially $3 a ton above the Pittsburgh base price. Chicago mills, generally, maintained the $2 differential over Pittsburgh.

Domestic freight car buying in 1928 declined sharply, indications pointing to about 47,000 against 63,295 in 1927. This year was the poorest since 1921.

Locomotive buying for domestic account involved about 325, against 840 in 1927 and 820 in 1921, the smallest up to last year.

Cast Iron Pipe Regains Profitable Position

PRODUCERS of cast iron pressure pipe closed the year with books showing a volume of business only a few points below 1927. This was in the face of a decidedly depressed market in first half, which compared unfavorably with the similar period in 1927.Decreasing real estate operations in many sections cut down purchasing of pipe.

Sharp competition between plants employing different processes of manufacture brought the average price at New York to the lowest level in years. The tendency there was consistently weaker than at other leading consuming centers for most of the year, but at the close that market had strengthened perceptibly.

The Year's Range	High	Low
Birmingham	$37.00	$28.00
Chicago	47.20	34.20
New York	51.60	36.80

Municipal buying was sporadic. Activity at Detroit and Chicago was close to 1927 but individual tonnages usually were smaller. A late season delayed spring buying in several districts. Welded steel pipe again competed in large line projects. A notable tendency developed in ordering larger sizes of cast iron pipe, particularly 12 inches and over.

The break in prices in July, 1927, carried over until March, 1928, when producers succeeded in strengthening the Birmingham base quotation. Late in 1928 the Birmingham quotation for the larger sizes had reached the level of the peak in March and April, 1927, at $38. In the last half of 1928, prices were $4 to $5 a ton above the average of the last half of the preceding year.

Sheets Recover In Last Half

Automobiles, Agricultural Implements, Radios, All Absorb Larger Tonnages—Last Half Comeback Makes Up For First Half Deficiencies—Prices Fluctuate, Partially Recovering Second Quarter Rout

EXPANDED use of sheets in the agricultural implement, automobile and radio industries carried production during 1928 to its highest level since the war. Most betterment came in the last half. Great growth also was made in the use of metal furniture finish by builders of electric refrigerators, etc. Demand for electrical sheets exceeded 1927 by a fair margin. Sheet buying by car builders, subnormal most of the year, was particularly marked in January, August and November. In the West, blue annealed sheets came into greater use for metal containers, steel barrels, drums, and small portable tanks. Metal furniture manufacturers absorbed larger tonnages. A development is the wider use in the production of kitchen ware of stainless steel sheets, which are corrosion and heat resistant.

At times, stripsheets offered keen competition, particularly to blue annealed sheets, in the Detroit area, almost to the latter's elimination. That this supplanting in general has been less extensive than anticipated is a source of disappointment to some stripsheet producers.

Continuous sheet mills, with their heavy tonnage output at relatively low production costs, aided some makers to meet demand for deliveries in the third and fourth quarters.

Automotive industries made heavy drains upon producers of normalized sheets. However, it proved impossible at times fully to meet customers' delivery requirements. Operators of that type of equipment had backlogs of several weeks when delivery requests were most urgent.

When in February books were opened for second quarter at 2.10c, 2.90c, 3.75c and 4.15c, Pittsburgh, for blue annealed, black, galvanized and full finished, respectively, an effort was made to bring about increases of $3 on the latter grade and $2 on the former three. This proved abortive. Gradual concessions finally caused the price structure to disintegrate. This was mainly superinduced in April when Michigan automobile builders' tonnage was booked at 4.00c. By June and July blue annealed had been sold as low as 1.90c, black at 2.55c and galvanized at 3.40c.

Increased demand came in July and August. Levels became more stabilized and by the middle of August a $2 advance was definitely inaugurated, taking the markets to 2.00c, 2.75c and 3.50c. These were announced the middle of September for fourth quarter contracts. Reduction of the cash discount from 2 to one-half of 1 per cent, effective Oct. 1, a virtual advance, was made fully effective. Then followed the most active period of the year. All tonnage possible was specified before the change and numerous fourth quarter contracts were booked. Heavy tonnages accepted on third quarter contracts proved insufficient and large purchases with consequent heavy shipments continued throughout the year. Just before the middle of November a further $2 increase was made.

Year's Sheet Situation Summarized

1926	Total hot mills U. S.	Sales	Per cent of capacity	Production	Per cent of capacity	Shipments	Per cent of capacity
November	712	185,235	57.8	278,455	86.9	262,797	82.0
December	712	240,862	73.1	238,345	72.3	219,498	66.6
1927							
January	712	261,357	84.9	256,856	83.5	239,019	77.7
February	712	241,951	84.5	282,171	97.4	261,412	90.3
March	712	345,900	104.7	359,340	108.8	338,436	102.5
April	712	292,965	95.6	316,100	103.1	300,858	98.1
May	712	212,337	67.7	309,360	98.7	302,759	96.6
June	712	224,321	71.6	300,706	95.6	281,395	89.7
July	719	230,715	78.1	237,243	80.2	252,034	85.3
August	719	177,647	53.5	266,645	80.3	266,713	80.3
September	719	258,427	73.3	220,919	62.6	230,443	65.3
October	719	234,358	68.4	245,765	71.7	232,626	67.9
November	718	344,519	97.8	232,041	65.9	224,789	63.8
December	719	530,197	154.7	260,130	75.9	221,689	64.7
1928							
January	720	302,921	85.7	316,541	89.6	274,126	77.6
February	718	266,210	79.5	330,565	98.7	298,420	89.1
March	721	399,441	112.4	366,127	103.0	359,532	101.1
April	721	284,070	84.7	327,909	97.8	327,674	97.7
May	721	250,316	68.5	349,367	95.6	326,324	89.3
June	721	318,902	96.5	311,629	94.3	308,741	93.4
July	721	333,357	102.4	267,685	82.2	278,310	85.5
August	721	254,397	71.7	329,396	92.8	324,691	91.5
September	721	370,936	117.5	318,907	101.0	322,876	102.2
October	724	344,614	96.6	369,243	103.5	354,925	99.5

Steel Rail Tonnage Falls Below Expectation

RAIL demand during 1928 was not as large as had been expected because a number of roads failed to exercise in full their options for tonnage in addition to primary purchases in the fall of 1927. Fall buying in 1928 indicated that 1929 rail production probably will not show much change from 1928.

Tendency toward the use of heavier rails continues. The heaviest section now rolled is 136-pound, specified by an eastern road. Much of the demand involves 100 to 130-pound sections; but a number of roads, particularly in the Southwest, still order 90-pound rails. The tendency toward longer rails also continues; while a good proportion of the tonnage still is cut to 33-foot lengths, the proportion of 39-foot lengths is increasing.

Seasonal character of rail rolling is less pronounced and the summer lull in rail production is not as marked as in former years. In fact, rail rolling now stretches out over nearly 10 months. Thus there is less necessity of alternating other products with rails, and some rail mills are reserved exclusively for rolling rails, although others roll shapes, bars and billets as alternate products

Tonnage of light rails sold in 1928, and for 1929 delivery, was lighter than in some former years. Light rails rolled from new billets generally were quoted at $36 per gross ton during the year, while light rails rolled from rail steel were about $2 less per ton.

Imports of standard rails were negligible. Certain American rail-

Light Rail Prices by Quarters, 1919-1928

Per Pound

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
Jan. 1	2.75c	2.45c	3.00c	1.50c	2.15c	2.10c	1.80c	1.80c	1.80c	1.80c
April 1	2.45c	3.25c	2.50c	1.60c	2.25c	1.95c	1.70c	1.70c	1.80c	1.80c
July 1	2.45c	3.75c	2.20c	1.75c	2.25c	1.90c	1.70c	1.70c	1.80c	1.80c
Oct. 1	2.45c	3.50c	1.65c	2.15c	2.15c	1.80c	1.60c	1.80c	1.80c	1.80c

roads which in recent years imported tonnage of European rails have been buying from domestic makers. Imports of light rails also have dropped off materially.

Track fastenings and tie plates, which all the year remained fairly steady as to price, enjoyed a decided pickup in demand latterly. The increased tonnages accompanied the large orders for standard rails placed in the last quarter by many of the large rail interests. Late in November and early December some of these orders aggregated 20,000 to 30,000 tons weekly, contributed by such roads as usually contract for large tonnages each fall. Prices moved little.

American Ferroalloy Makers Retain Market

RECORD production of steel brought about unusual demand for ferroalloys during 1928. Ferromanganese not only enjoyed unusual demand, but moved up from the extremely low price levels which had prevailed. From $90, duty paid, tidewater, the price in the last half of 1927, the market moved up to $100 in the first half of 1928 and to $105 in the last half. Sellers have reaffirmed the $105 price for the whole of 1929. American producers continue the dominating factors in supplying domestic demand, but considerable metal continues to come from Canada, and some from England and Norway. Domestic manganese ore producers showed signs of developing their industry in the near future. Progress has been made particularly in the method of concentrating domestic ferromanganese ore, giving it a good blast furnace structure which is expected to reduce greatly the percentage of manganese loss. Foreign ore, particularly Caucasian ore, continues the mainstay of ferromanganese manufacturers here. The market on high-grade foreign manganese ore during the year remained at 38 to 40 cents per unit, c.i.f. tidewater, but declined about 2 cents a unit in November in connection with sales for forward shipment.

With tariff hearings scheduled to be held at Washington in January and February, domestic producers of ferromanganese and manganese ore continue desirous of as much protection as they can get, and can be relied on to oppose any attempt to get the present rates reduced. The present rates are 1 cent per pound of metallic manganese in manganese ore, and 1⅞ cents per pound of manganese in ferromanganese.

Spiegeleisen enjoyed active demand in 1928. The price on carloads was $32, furnace, on the 19 to 21 per cent grade, at the beginning of the year, being advanced to $33 in June and again to $34 in November. These prices, as usual, were subject to quantity differentials on large tonnages. English spiegeleisen, mainly of higher manganese content, was sold here in scattered lots all through the year.

Special ferroalloys were remarkably steady through 1928, the only changes outside of tungsten being at the beginning and end of the year. In fact there has been little change in alloy prices since the beginning of 1925, with most of the subsequent revisions downward despite the large tonnages moving. In point of volume the business of the past year was high, reflecting the good business in steel.

Imports and Domestic Production of Manganese Alloys—Imports of Manganese Ores

In Gross Tons

	Production		Imports		Imports
	Ferromanganese	Spiegeleisen	Ferromanganese	Spiegeleisen	Manganese ore
1928*	316,000	102,500	†46,458	.....	‡222,968
1927	295,849	97,328	†34,018	.....	‡308,594
1926	319,510	74,070	†43,684	.....	‡364,307
1925	260,149	65,747	†77,597	.....	‡289,703
1924	199,418	107,135	†47,811	.....	‡231,393
1923	242,450	123,148	91,066	4,668	‡206,048
1922	150,039	68,589	95,007	8,157	374,451
1921	100,694	55,042	9,057	307	401,000
1920	286,365	110,685	59,254	5,234	601,437
1919	175,009	84,014	33,022	27	333,344
1918	325,133	303,535	27,168	.....	491,303
1917	328,000	187,000	51,800	.....	663,500
1916	275,204	187,233	90,928	.....	576,321
1915	144,260	114,556	55,263	200	313,985
1914	100,731	76,625	82,997	2,870	283,294
1913	119,495	106,980	128,070	77	345,090
1912	125,378	102,561	99,137	1,015	300,661
1911	74,602	104,013	80,263	20,970	176,852
1910	71,376	153,055	114,228	25,383	242,348
1909	82,209	142,831	88,934	16,921	212,765
1908	40,642	111,376	44,624	4,579	178,203
1907	55,918	283,430	87,400	48,994	209,021
1906	55,520	244,980	84,359	103,268	221,260
1905	62,186	227,797	52,841	55,457	257,033

*Estimated. †Includes Spiegeleisen. ‡Manganese content.

The use of ferrochrome has been especially big, both the high and low carbon grades showing expansion. At the beginning of 1928 contract prices on chrome and silicon alloys were cut while ferrovanadium was left unchanged. Ferrosilicon was reduced from $85 a ton to $83.50, and continues at that contract price for 50 per cent into 1929. The 75 per cent grade was cut $5 early last January to $130, after a cut a few months earlier of $10, but has remained unchanged since that time, including the announcement for this year's contracts.

Ferrochrome contracts were cut 50 cents at the beginning of 1928 to 11.00c a pound, contained, on high carbon, and have been announced to continue at that price into 1929.

The quotation on the low carbon grade was reduced 1 cent a year ago to 30.00c a pound, contained, for 0.10 per cent, and 1 cent farther for 1929 contracts.

Ferrotungsten began the year a little under $1 a pound, contained, and went down to about 90.00c, but since last spring it has been firming up, going a little above $1 lately on account of rapid recovery in the wolframite ore market to $11.50 a short ton unit, duty paid.

In the forthcoming tariff hearings to be held in Washington beginning in January it is expected that all ferroalloy duties will be considered. If the past is a guide, consumers will object to any rises.

Strip Has Broader Application

Radio Industry Takes Appreciable Tonnage—Automotive and Many Other Consuming Lines Increase Their Specifications, Spreading Demand More Evenly Over Year—1929 Prospects Bright

BROADENED scope of application in radio and numerous other lines; enlarged consumption by automotive, electric appliance, household hardware, agricultural implement and other manufacturers; production rates averaging 70 to 80 per cent most of the year, attributed to a better distribution of buying over the 12-month period by most purchasers, are some of the more favorable developments in the 1928 strip steel market. In connection with the latter item, the bringing out of new models of automobiles at various times through the year instead of grouping them created a favoring factor

Less favorable conditions presenting difficulties, which at times seemed almost insurmountable, included such items as maintenance by customers of their low stocks and piecemeal buying policies, necessitating frequent roll changes which brought consequent high productive costs; unusually sharp competition both within the strip steel circle and contributed from without by sheet and plate producers and discrepancies in extra observance. The constant effort of automotive purchasers to bear down on price, accompanying such efforts with threats to take their large tonnages elsewhere, likewise constituted a hazard with which the industry battled.

Automotive tonnage specifications grew in volume in the first quarter, dropped off in the second, increased measurably in the third and were fairly well maintained in the fourth. Large tonnages by Ford Motor Co. and General Motors Corp. were features of the third quarter. In November some interruption came to specifications, occasioned by bringing out new models and the approach of inventories. The last half of December, however, saw a resumption of specifying activity for material needed in January. This year promises to exceed the 1928 consuming rates, particularly in automotive lines.

Almost chaotic conditions prevailed at times in connection with quotations, particularly on hot strips. Often each individual order for that grade was considered on its own merits, net price only being viewed. At one time in February four or more bases were used, under 3-inch, 2.20c to 2.40c; 3 to 6-inch, 2.10c to 2.20c; 6 to 12-inch, 1.90c to 2.00c and 12 to 24-inch, 1.85c or 2.10c, depending upon whether plates or sheets were in competition. Most of the year, however, three bases were followed. In October producers issued a new extra card, endeavoring to inaugurate a single base. In this they were only partially successful, since two were used from then on, 1.90c on 6 1/16 to 24-inch and 2.00c on ⅜ to 6-inch. Those prices applied for some fourth quarter business but large buyers were able to develop $2 less. The same condition held true in connection with first quarter, 1929, contracts. The year started at 1.80c. Feb. 10 a $2 advance was tried but this disappeared by April. Despite intermittent efforts to advance the market, some second and third quarter contracts went around 1.75c. Wider fluctuations took place on narrow sizes. Tonnages were heavier in the wide sizes but in numbers of orders, the narrow was favored.

In cold strips, prices were advanced $3 Jan. 25 to 3.15c base (2.90c in large quantities). By April the old 2.75c price for large lots was in evidence and by July some makers had gone to 2.65c and even to 2.60c on brake band stock. The new extra card of Aug. 21 only partially removed price difficulties. Then prices were advanced to 2.85c for the fourth quarter.

Heavy Use of Metals Brings Prosperous Year

NEW HEIGHTS of consumption and wide swings in prices characterized the nonferrous metals in the past year. In the early months prices fell to the lowest levels of the past few years, except that copper, which had started on its remarkable upward path several months earlier, held its ground in that period.

The gradual increase in the general rate of business made itself felt in the metal markets. With constructive steps within the industry, prices rose gradually through the summer and autumn and were highest in the latter part of the year. Tin was an exception, still being several cents lower than in January, but copper sold through most of the last quarter at 16.00c, Connecticut, the highest price attained in several years' time.

Consumption of all metals was unusually large, reaching high levels in the autumn. In copper the producers sought to keep up with consumption, and output lagged behind use considerably at times though actually larger than ever before. In the other metals the situation was much different, expanding consumption not being quite

Average Monthly Nonferrous Prices in 1928

Prompt, wholesale prices, cents a pound

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tin, spot straits, New York.....	55.616	52.434	52.174	52.323	51.577	47.938	47.092	48.038	48.033	49.039	50.776	50.000
Copper, electro, del., Conn.....	14.122	14.080	14.104	14.238	14.440	14.750	14.750	14.750	14.958	15.442	16.000	16.000
Zinc, prime western, E. St. L.....	5.644	5.551	5.629	5.760	6.032	6.159	6.200	6.249	6.250	6.250	6.266	6.350
Lead, open market, New York	6.500	6.343	6.014	6.100	6.126	6.300	6.220	6.248	6.450	6.500	6.387	6.500
Aluminum, 98-99 per cent*, del...	23.90	23.90	23.90	23.90	23.90	23.90	23.90	23.90	23.90	23.90	23.90	23.90
Antimony, spot, New York.....	10.980	10.845	10.163	10.250	10.906	9.845	9.516	10.093	10.643	11.007	10.168	9.875
Nickel, ingot	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

*Open market.

so rapid as expanding output. This was true particularly in zinc and tin. In lead there was a falling off in consumption early in the year to the lowest level in several years, but later this situation was corrected by decrease in output and an increase in consumption. The uses of nickel and aluminum were larger than ever.

The increased number of automobiles built the past year was important to practically all metals, and in the nonferrous field it was felt particularly by brass and copper rolling mills. The batteries for these cars naturally took a larger tonnage of lead, while the increased automobile demand for solder and babbitt was great.

Foreign domestic markets in the nonferrous metals were less closely related this year than in most other years since the war. Zinc here and in Europe has been in two distinct markets, with the export business almost vanishing. On the other hand copper exports were larger than ever before, though in the latter part of the year exports were not so great as earlier, and it was primarily domestic demand that carried the market to 16.00c, Connecticut. Many other developments in the metal markets were important in the past year, such as the formation of the National Metal exchange to trade in tin, and the formation of the Lead Industries association.

Piecemeal Steel Buying Policy Favors Jobbers

RECOVERY was registered by most jobbers in the last half, after declining sales in the first six months brought the total for that period below the first six months of 1927. For the most part the first three months showed consecutive gains but the second quarter showed up poorly, although in certain territories improved weather conditions from April to June were immediately reflected in increased buying of steel for building construction, since quick deliveries were sought everywhere. The same tendency was encountered in third quarter after a lull during the extreme heat of August. The last quarter was particularly fruitful for the warehouses, for as mill deliveries became increasingly deferred, buyers depended upon jobbers' stocks. On the whole, last half buying, particularly from September to November, was much more pronounced.

As the automotive industry improved during third quarter, increased buying by machine shops and parts makers was encountered. Throughout the the year small orders were typical. At times, numerous repeat orders were received from the same buyer in a given 10-day period. This hand-to-mouth policy, a heritage handed down from the post-war period, rather favored the jobber during the year just closed, since it was not always possible to obtain the required delivery on certain steels, from mills, particularly far from mill centers.

Philadelphia, Baltimore, New York and other eastern jobbing centers made consistently constructive efforts to remove inequalities in quotations, thus endeavoring to inspire more confidence by stabilizing quotations by means of quantity differentials, and in other ways clarifying the price situation. Gradually the field for the application of quantity differentials was widened until now they are practically universal.

Canadian Iron, Steel Markets Regain Stride

PREDICTIONS of a satisfactory industrial year for Canada were fulfilled in 1928. In iron and steel, as in other branches of industry, the year was the best since 1920 and the outlook is that 1929 will shape up equally as good, if not better. Some believe the dominion has at least five years of steady improvement ahead.

CANADIAN OUTPUT OF PIG IRON
In gross tons

Year	Pig Iron	Ferroalloys
1923	880,018	28,961
1924	593,024	26,400
1925	570,397	25,709
1926	737,503	57,416
1927	709,697	56,514
1928*	1,023,663	40,266

*December estimated.

Practically all Canadian producers of iron and steel turned the corner after waging an uphill fight for their very existence.

Last year control of the Lake Superior Corp. and its subsidiaries, including the Algoma Steel Corp., at Sault Ste. Marie, passed from American hands into a Canadian syndicate headed by Robert Dodd. The British Empire Steel Corp. group of industries, including the Dominion Iron & Steel Co., at Sydney, passed to Holt, Gundy & Co. from the control of Roy Wolvin and associates. The Lake Superior corporation plans to spend $12,000,000 on plant improvement in the next few years. Operations of the Algoma corporation in 1928 were the best since 1920. The rail mill was on double or single shift the entire year.

The Dominion company also experienced its best year since the war. Rail mill and other departments operated continuously through 1928. Last year was the first that a United States railroad bought rails in Canada.

The Steel Co. of Canada Ltd., Hamilton, Ont., likewise experienced an exceptional year. It was at capacity operation most of the year. A development program announced recently entails an expenditure of nearly $7,000,000 and includes open-hearth furnace expansion and replacement of its 10 and 14-inch rolling mills.

Raw materials reflected the generally improved conditions in the dominion. Sales of foundry and malleable iron increased 30 per cent over 1927. Also, imports from the United States increased considerably. In a general way, production of both pig iron and steel ingots in the first ten months of 1928 exceeded all of 1927. Detailed comparisons of production are given in the accompanying tables.

Notwithstanding the general improvement in demand and production, pig iron prices fluctuated narrowly in 1928 in Canada. The Canadian price for No. 1 foundry iron (2.25 to 2.75 silicon) opened 1928 at $23.60, Toronto. In March the price dropped 50 cents and held at this level to the middle of October, when it returned to $23.60.

CANADIAN OUTPUT OF STEEL
In gross tons

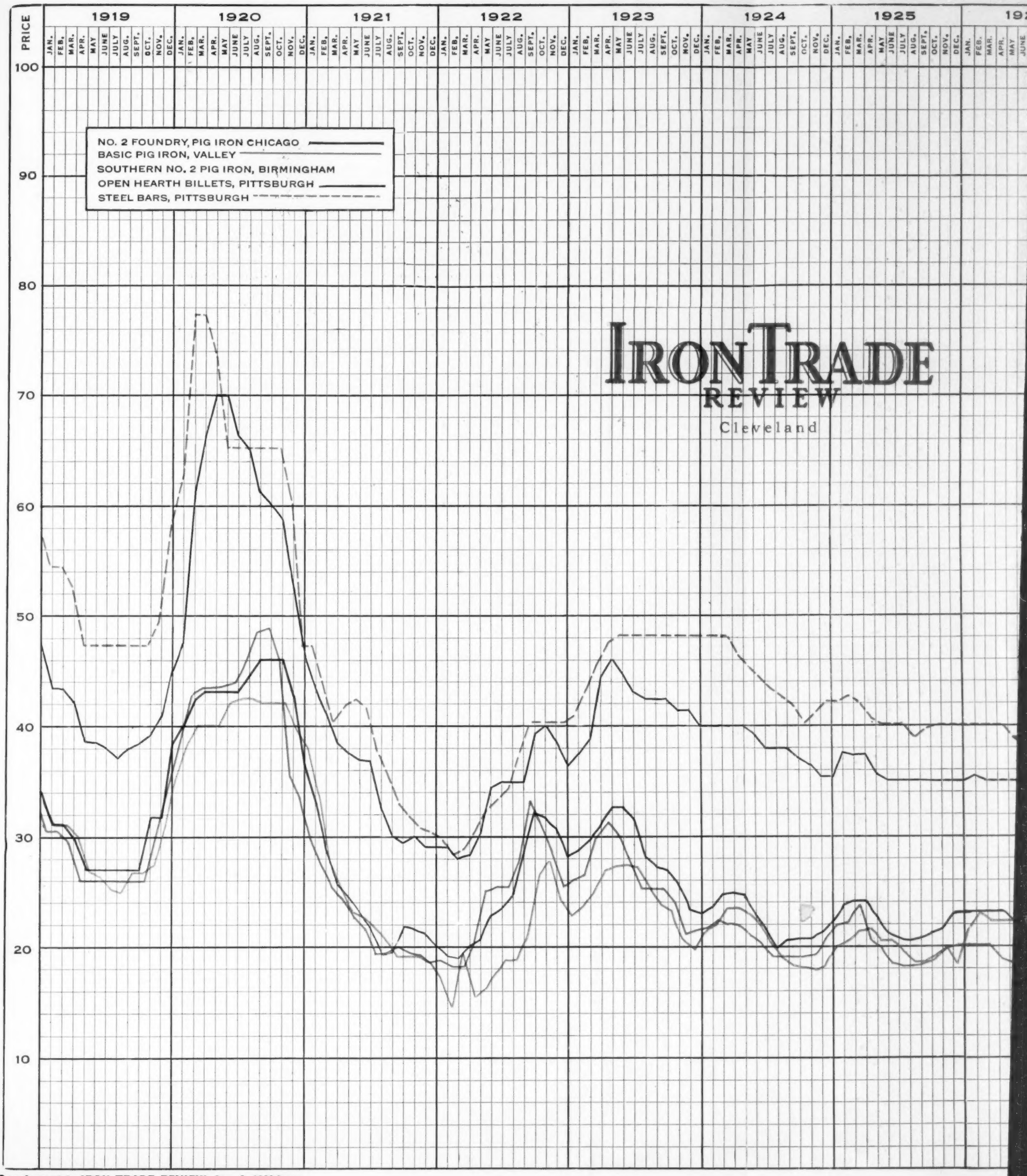
	Steel Ingots	Steel Castings
1923	839,710	45,060
1924	625,175	25,515
1925	733,855	18,840
1926	743,550	33,338
1927	867,928	39,710
1928*	1,204,276	42,221

*December estimated.

Sales of scrap reached a new high level in Canada in 1928 but prices were almost stationary. Consumer buying in the closing sixty to ninety days of the year was at its peak. The year's sales probably exceeded 1927 by over 30 per cent. The price situation, however, left no general satisfaction among sellers.

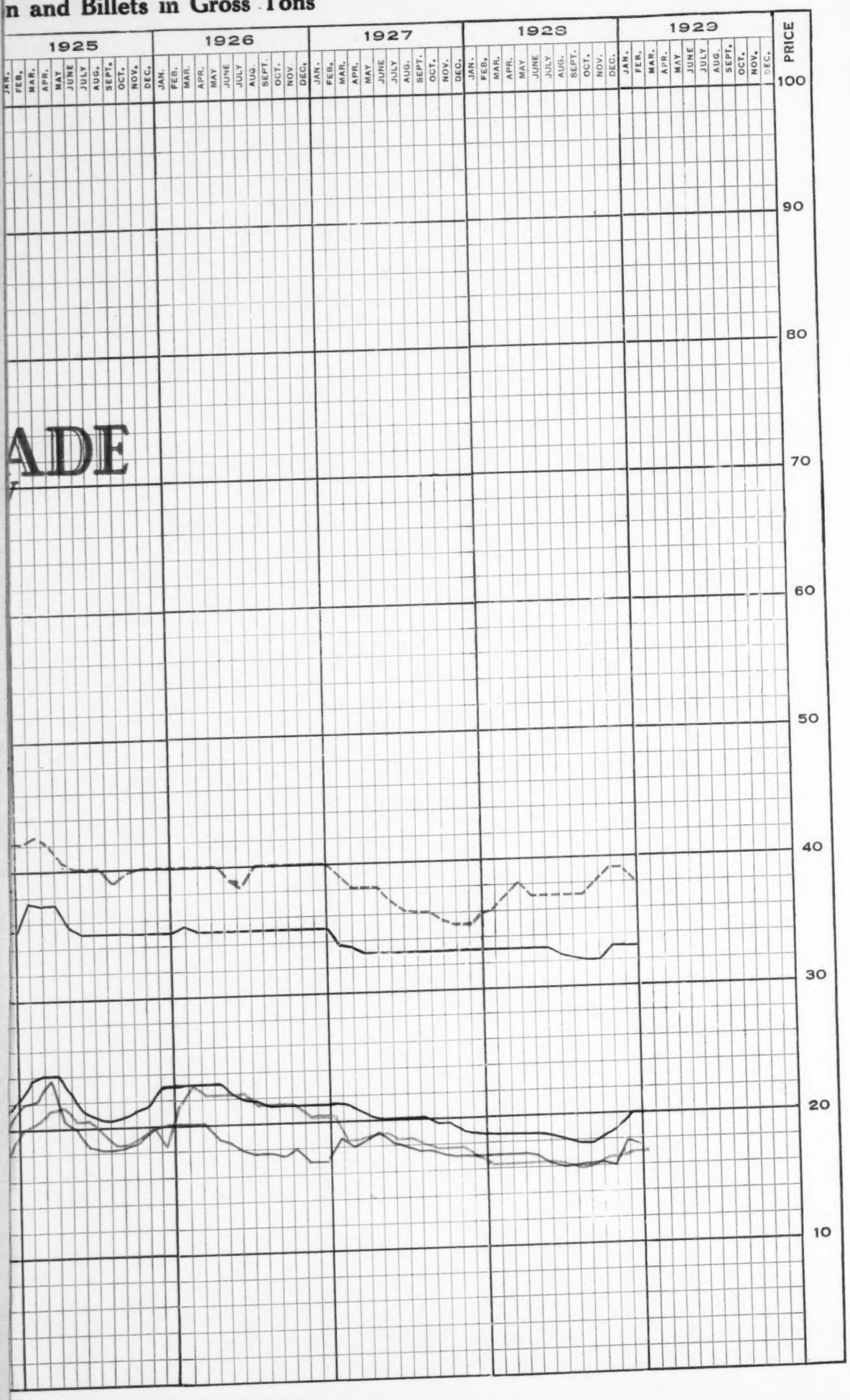
Monthly Prices of Typical Iron and Steel Products

Finished Steel Prices in Net Tons, Pig Iron and Billets in Gros



eel Products for Past Decade

n and Billets in Gross Tons



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Prices Tell Market History

Ores and Alloys

Per Gross Ton

Spiegeleisen, 1915-1928

At Producers' Furnaces

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$32.00	$32.00	$32.00	$32.00	$32.00	$32.00	$33.00	$33.00	$33.00	$33.00	$33.00	$34.00
1927.....	37.00	37.00	37.00	37.00	35.50	34.80	34.00	33.35	33.00	30.15	30.00	31.00
1926.....	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	38.75	37.00
1925.....	32.00	33.00	33.00	33.00	33.00	32.00	31.50	32.25	33.00	33.00	34.00	34.00
1924.....	39.00	39.00	38.00	36.00	36.75	36.00	35.00	32.50	32.00	31.00	31.75	31.00
1923.....	34.90	35.75	37.25	39.25	43.00	46.00	45.00	45.00	43.50	40.00	39.00	38.00
1922.....	25.50	28.00	28.00	30.00	35.00	35.25	35.00	37.00	38.00	37.75	36.80	35.50
1921.....	46.25	37.75	34.20	32.00	31.75	29.60	27.50	26.20	25.25	24.85	25.00	25.00
1920.....	46.60	57.60	60.40	66.85	75.00	75.00	75.00	79.35	82.00	80.00	74.35	57.90
1919.....	*67.50	*52.50	*42.50	*34.50	*31.35	*27.50	34.00	34.00	34.00	34.00	34.00	39.00
1918.....	59.00	59.00	65.50	*70.00	*71.00	*75.00	*75.00	*75.00	*75.00	*75.00	*75.00	*72.50
1917.....	57.50	66.25	77.50	76.75	78.00	83.00	85.00	81.25	80.50	73.50	63.25	60.00
1916.....	32.50	42.50	55.00	60.00	60.00	55.00	47.50	47.50	45.00	40.00	45.00	50.00
1915.....	25.00	25.50	26.00	26.00	26.00	26.00	26.00	26.00	29.00	30.00	30.00	30.00

*Prices from and including April, 1918, and to and including June, 1919, are for 16 per cent spiegeleisen. All other prices apply to 20 per cent metal.

Ferrosilicon, 10 Per Cent 1916-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
1927.....	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	33.50	32.00	30.00
1926.....	35.00	35.50	36.00	34.40	33.00	33.00	33.00	33.00	33.00	33.25	24.00	34.00
1925.....	39.50	39.50	39.50	37.50	35.50	35.50	35.50	35.50	34.00	33.50	34.25	35.00
1924.....	41.50	42.50	42.25	41.50	40.30	39.50	39.50	39.50	39.50	39.50	39.50	39.50
1923.....	44.50	45.50	47.10	48.50	48.50	48.00	46.50	43.50	43.50	43.50	41.50	41.50
1922.....	38.50	37.50	36.50	37.25	40.50	41.50	41.50	42.50	48.50	50.00	48.00	44.50
1921.....	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	52.50	57.50
1920.....	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50
1919.....	54.00	54.00	52.95	47.40	45.00	47.40	49.75	49.75	49.75	49.75	54.75	58.50
1918.....	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	57.00	57.00	57.00
1917.....	42.00	42.00	49.80	57.00	67.00	82.50	92.25	95.00	95.00	95.00	55.00	55.00
1916.....	28.00	28.00	31.00	31.00	32.00	32.00	32.00	31.80	30.25	30.50	34.60	42.00

Ferrosilicon, 50 Per Cent 1916-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50	$83.50
1927.....	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1926.....	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1925.....	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1924.....	75.00	75.00	75.00	75.00	75.00	75.00	74.50	74.50	74.50	75.00	75.00	82.50
1923.....	85.00	90.00	92.50	95.00	95.00	87.50	82.50	82.50	82.50	82.50	80.00	75.00
1922.....	57.50	55.00	54.00	55.00	57.50	57.50	55.00	55.00	55.00	70.00	82.50	82.50
1921.....	80.00	92.00	93.00	90.00	80.00	75.00	75.00	65.00	65.00	60.00	60.00	57.00
1920.....	82.00	80.00	83.00	80.00	83.00	82.50	82.50	80.00	82.50	82.50	80.00	80.00
1919.....	145.00	125.00	115.00	110.00	100.00	85.00	80.00	78.00	80.00	85.00	80.00	80.00
1918.....	175.00	175.00	177.50	172.50	170.00	170.00	165.00	153.50	150.00	151.00	150.00	150.00
1917.....	122.50	156.25	175.00	187.50	230.00	230.00	237.50	225.00	212.50	171.25	157.50	172.50
1916.....	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	94.25	95.00	95.00

Ferrochrome, 4-6 Per Cent, 1918-1928

Per Pound of Metallic Chromium Contained

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	11.00c	11.00c	11.00c	11.00c	11.00c	11.00c	11.00c	11.00c	11.00c	11.00c	11.00c	11.00c
1927.....	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50
1926.....	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50
1925.....	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50
1924.....	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75
1923.....	12.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
1922.....	14.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	13.00	13.50	13.50
1921.....	17.50	17.25	17.25	16.25	16.00	15.00	15.00	14.00	14.50	14.50	14.50	14.50
1920.....	22.50	19.50	19.50	19.50	18.50	18.50	21.50	20.00	18.50	18.50	18.50	18.50
1919.....	41.00	32.50	31.00	31.00	32.00	32.00	32.00	32.00	29.00	29.00	28.00	28.00
1918.....	.....	.....	.....	.....	.....	.....	44.00	41.00	41.00	41.00	41.00	41.00

Ferrotungsten, 1918-1928

Per Pound of Metallic Tungsten Contained

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$0.94	$0.93	$0.93	$0.93	$0.95	$0.96	$0.97	$0.97	$0.97	$0.97	$0.98	$1.00
1927.....	1.05	1.05	1.01	1.00	0.98	0.98	0.96	0.94	0.92	0.92	0.92	0.95
1926.....	1.14	1.14	1.14	1.09	1.08	1.00	1.00	1.00	1.00	1.00	1.05	1.05
1925.....	0.86	0.88	0.93	1.02	1.00	1.01	1.07	1.07	1.10	1.11	1.12	1.15
1924.....	0.87	0.86	0.88	0.90	0.91	0.90	0.89	0.87	0.87	0.87	0.87	0.87
1923.....	0.87	0.87	0.89	0.90	0.92	0.92	0.95	0.88	0.87	0.87	0.87	0.87
1922.....	0.42	0.37	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.85	0.92	0.92
1921.....	0.65	0.57	0.57	0.47	0.47	0.50	0.50	0.47	0.36	0.36	0.36	0.36
1920.....	1.05	1.05	1.00	1.00	1.05	1.07	1.12	1.10	1.10	0.95	0.95	0.95
1919.....	2.35	2.15	2.07	1.75	1.40	1.32	1.30	1.22	1.25	1.25	1.20	1.15
1918.....	1.95	2.72	1.98	2.32	2.26	2.23	2.25	2.32	2.32	2.55	2.65	2.45

Market History —

Ferromanganese, Delivered, Pittsburgh, 1914-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$104.79	$104.79	$104.79	$104.79	$108.19	$109.79	$109.79	$109.79	$109.79	$109.79	$109.79	$109.79
1927.....	104.79	104.79	104.79	104.79	98.54	94.79	94.79	94.79	94.79	94.79	94.79	103.42
1926.....	119.79	119.79	102.29	92.79	92.79	92.79	92.79	92.79	92.79	99.79	104.79	104.79
1925.....	116.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79
1924.....	113.79	112.29	112.29	112.29	112.29	112.79	110.79	98.79	97.79	104.79	107.29	109.79
1923.....	109.79	112.29	120.79	124.79	129.79	129.79	122.29	122.29	114.79	112.79	113.79	113.79
1922.....	61.90	65.32	67.82	69.07	72.32	72.82	72.29	72.29	†80.59	105.47	104.92	104.92
1921.....	101.00	96.85	89.00	87.50	83.00	76.50	75.00	70.75	64.75	61.65	60.00	60.00
1920.....	146.00	160.00	172.00	200.00	200.00	198.00	190.00	193.75	172.40	156.40	153.00	120.00
1919.....	*212.50	165.00	134.00	113.75	110.00	111.75	111.00	110.00	105.00	110.00	110.00	121.00
1918.....	250.00	250.00	250.00	250.00	*250.00	*250.00	*250.00	*250.00	*250.00	*250.00	*250.00	*236.00
1917.....	175.00	192.50	212.50	250.00	375.00	400.00	400.00	387.50	380.00	300.00	247.50	242.50
**1916....	139.88	215.13	334.75	412.50	347.75	244.88	198.75	173.18	167.67	160.00	155.00	162.50
1915.....	68.00	78.80	95.00	95.00	97.00	105.00	103.57	101.36	110.00	109.64	100.42	103.04
1914.....	43.57	39.01	39.02	38.68	38.16	38.00	37.54	102.08	93.45	70.80	67.85	68.00

*Prices from May, 1918, to January, 1919, inclusive, were based on 70 per cent ferromanganese. All other prices in above table were based on 80 per cent metal.

†Duty of 1¾ cents per pound contained manganese became effective on ferromanganese Sept. 21.

**Quotations seaboard to Jan., 1917, delivered Pittsburgh thereafter.

Manganese Ore, 1915-1928

Dollars Per Gross Ton, Duty Paid, North Atlantic Ports, on Basis of 50 Per Cent Ore

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$30.20	$30.20	$30.20	$30.20	$30.20	$30.20	$30.20	$30.20	$30.20	$30.20	$29.20	$29.20
1927.....	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70
1926.....	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70
1925.....	32.20	32.70	33.20	33.20	32.70	32.20	32.20	32.20	31.70	31.70	31.70	31.70
1924.....	31.20	32.70	23.20	32.20	32.20	31.70	30.70	30.20	30.20	30.20	31.70	32.20
1923.....	29.45	29.45	31.70	33.20	32.70	32.95	32.95	32.95	31.70	31.70	31.70	31.70
1922.....	10.50	11.00	12.50	12.75	12.75	13.25	13.50	13.75	*14.35	25.50	25.50	25.50
1921.....	18.75	17.50	17.25	14.00	14.00	12.50	12.50	12.50	12.50	12.50	12.50	12.00
1920.....	30.00	38.75	38.75	32.25	35.00	37.50	42.25	35.00	35.00	32.75	25.00	21.25
1919.....	55.50	38.75	37.50	30.00	30.00	30.00	31.25	31.25	30.00	27.50	27.50	27.50
1918.....	63.75	63.75	60.00	65.00	65.00	65.00	68.50	65.00	65.00	65.00	62.50	55.00
1917.....	30.00	30.00	40.00	40.00	50.00	50.00	50.00	50.00	60.00	60.00	60.00	60.00
1916.....	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	30.00	30.00	30.00	30.00
1915.....	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	22.50	22.50	22.50	22.50

*After Sept., 1922, duty 1c per pound metallic content, $11.20 per gross ton 50 per cent ore.

Pig Iron

Per Gross Ton

Malleable, f.o.b. Valley, 1913-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$17.25	$17.25	$17.25	$17.25	$17.25	$17.00	$17.00	$17.00	$17.10	$17.35	$17.90	$18.00
1927.....	18.50	18.10	18.40	18.50	18.50	18.25	17.50	17.50	17.50	17.50	17.50	17.25
1926.....	20.50	20.50	20.50	19.30	19.00	18.00	17.80	17.50	17.70	18.35	19.75	19.00
1925.....	22.75	22.25	21.25	20.10	19.00	18.50	18.50	18.50	18.80	19.35	20.35	20.50
1924.....	22.00	23.00	22.50	22.20	21.30	19.75	19.00	19.00	19.50	19.50	19.75	20.50
1923.....	27.25	27.25	29.20	31.00	30.20	28.25	25.50	24.70	24.60	23.25	20.40	22.00
1922.....	19.45	19.00	19.00	20.40	24.60	24.50	25.00	28.60	34.00	32.30	29.25	26.25
1921.....	32.25	28.75	26.40	24.90	23.75	22.60	20.40	20.00	20.40	20.20	20.00	20.00
1920.....	38.95	41.60	42.35	41.60	41.60	41.85	43.40	48.25	50.50	48.25	40.40	36.00
1919.....	31.50	31.50	30.45	27.25	27.25	27.25	27.25	27.25	27.25	27.75	31.75	36.40
1918.....	33.50	33.50	34.45	34.45	34.45	34.65	34.90	34.90	34.90	34.50	34.50	34.50
1917.....	31.00	33.50	36.00	39.00	42.70	50.10	53.00	54.00	49.60	34.25	33.50	33.50
1916.....	19.00	18.65	18.50	18.50	18.50	18.50	18.50	18.50	18.55	20.15	25.85	30.75
1915.....	12.75	12.75	12.85	12.50	12.50	12.50	12.65	13.75	14.50	14.60	15.50	17.90
1914.....	13.15	13.19	14.15	13.25	13.25	13.00	13.00	13.00	13.00	12.90	12.75	12.75
1913.....	17.25	17.20	16.75	15.75	14.85	14.40	14.15	14.00	14.05	14.25	13.85	13.50

Basic, Valley, 1902-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$17.00	$17.00	$17.00	$16.75	$16.20	$15.80	$15.95	$16.00	$16.10	$16.85	$17.70	$17.50
1927.....	18.50	17.85	18.50	19.00	18.10	17.90	17.50	17.50	17.15	17.00	17.00	17.00
1926.....	20.00	19.50	21.00	19.80	19.25	19.00	18.70	18.00	18.20	19.10	19.25	19.75
1925.....	21.90	22.00	21.40	20.20	19.90	18.20	18.00	18.00	18.30	18.80	19.90	20.00
1924.....	21.40	22.00	21.70	21.70	20.70	20.00	19.00	19.00	19.00	19.00	19.25	20.50
1923.....	25.90	26.10	29.80	31.00	29.80	27.35	25.15	25.00	25.00	23.75	20.80	21.00
1922.....	18.30	17.95	17.95	20.20	24.65	25.00	25.00	27.40	32.90	30.50	28.10	25.20
1921.....	29.35	17.15	24.80	23.95	22.05	21.35	19.00	19.00	19.70	19.30	19.10	18.05
1920.....	38.20	42.25	43.00	43.00	43.25	43.65	45.75	48.00	48.50	45.25	34.90	33.00
1919.....	30.00	30.00	28.95	25.75	25.75	25.75	25.75	25.75	25.75	25.75	30.15	34.20
1918.....	33.00	33.00	33.00	32.00	32.00	32.00	32.00	32.00	32.00	33.00	33.00	33.00
1917.....	30.00	30.00	32.55	38.00	41.90	49.15	52.85	49.40	41.35	33.00	33.00	33.00
1916.....	17.85	18.00	18.25	18.00	18.15	18.00	18.00	18.00	18.65	20.30	27.25	30.00
1915.....	12.50	12.50	12.50	12.50	12.65	12.70	12.95	14.35	15.00	15.00	15.50	17.50
1914.....	12.35	13.05	13.05	13.00	13.00	13.00	13.00	13.00	13.00	12.85	12.50	12.50
1913.....	16.45	16.30	16.05	15.70	14.90	14.50	14.20	14.05	14.15	13.70	13.00	12.50
1912.....	12.40	12.25	12.75	13.00	13.00	13.20	13.50	14.00	15.15	16.20	16.20	16.45
1911.....	13.30	13.60	13.75	13.75	13.40	13.05	13.00	13.00	12.70	12.50	12.30	12.45
1910.....	16.90	16.30	16.00	15.95	15.05	14.70	14.50	14.00	13.85	13.15	13.35	13.45
1909.....	15.50	15.20	14.95	14.15	14.15	14.95	15.00	15.25	15.90	16.95	17.50	17.00
1908.....	17.10	17.00	16.00	16.00	14.85	15.25	14.50	14.60	14.25	14.25	14.95	15.50
1907.....	22.00	22.00	21.00	21.00	23.00	22.25	21.95	21.45	20.10	19.70	18.75	18.00
1906.....	17.00	16.70	17.00	17.15	17.25	17.50	17.25	17.75	18.40	19.30	21.00	23.00
1905.....	15.25	15.25	15.50	15.00	15.00	14.35	14.25	14.50	14.70	15.00	16.75	16.50
1904.....	12.85	12.50	12.90	13.10	12.50	11.65	11.35	11.75	11.65	12.05	13.95	19.65
1903.....	20.95	21.25	21.10	20.60	19.35	19.15	18.55	15.35	16.00	15.10	14.15	13.10
1902.....	19.75	16.15	16.50	17.50	15.75	20.65	20.60	20.60	20.65	20.70	20.90	20.90

Market History —

Bessemer, Delivered, Pittsburgh, 1895-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$19.26	$19.26	$19.21	$19.26	$19.26	$18.76	$18.76	$18.76	$18.86	$19.11	$19.96	$20.01
1927.....	21.26	20.76	21.16	21.26	20.86	20.66	20.26	20.26	19.86	19.76	19.76	19.26
1926.....	22.76	22.76	22.76	21.56	21.01	20.76	20.46	19.76	19.96	20.86	22.01	21.51
1925.....	24.66	24.66	23.96	26.76	21.66	20.76	20.76	20.76	21.06	21.56	22.66	22.76
1924.....	24.66	25.01	24.86	24.61	24.06	23.26	21.66	21.76	21.76	21.76	22.11	23.26
1923.....	29.27	29.57	31.67	32.77	32.07	30.27	28.52	28.07	28.27	27.27	25.47	24.27
1922.....	21.51	21.31	21.21	22.46	26.46	26.96	26.76	29.16	35.27	35.12	27.77	30.33
1921.....	33.96	30.96	28.96	27.46	26.06	25.06	22.96	21.96	22.46	22.06	21.96	21.96
1920.....	40.00	43.15	43.40	43.50	43.90	44.25	46.80	49.50	50.45	50.17	42.33	36.96
1919.....	33.60	33.60	32.55	29.35	29.35	29.35	29.35	29.35	29.35	29.35	32.00	36.65
1918.....	37.25	37.25	37.25	36.15	36.15	36.40	36.60	36.60	36.60	36.60	36.60	36.60
1917.....	35.95	35.95	37.45	42.20	44.95	55.20	57.95	55.55	48.27	37.25	37.25	37.25
1916.....	21.32	21.45	21.55	21.95	21.95	21.95	21.95	21.95	22.20	24.33	30.35	35.95
1915.....	14.70	14.63	14.55	14.55	14.55	14.58	14.88	15.89	16.80	16.95	17.45	19.70
1914.....	15.00	15.09	15.15	14.90	14.90	14.90	14.90	14.90	14.90	14.85	14.70	14.70
1913.....	18.15	18.15	18.15	17.90	17.90	17.26	16.65	16.52	16.65	16.60	16.09	15.90
1912.....	15.15	15.00	15.02	15.15	15.15	15.15	15.15	15.43	15.93	17.75	18.05	18.15
1911.....	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.39	15.10	15.15
1910.....	19.90	19.42	18.90	18.15	17.09	16.73	16.40	16.21	15.90	15.90	15.90	15.90
1909.....	17.34	16.78	16.34	15.80	15.48	16.13	16.37	17.13	18.33	19.68	19.80	19.90
1908.....	19.00	17.90	17.86	17.49	16.92	16.90	16.73	16.11	15.90	15.48	16.74	17.40
1907.....	22.92	22.78	22.85	22.16	24.10	24.10	23.30	22.90	22.90	22.80	20.60	19.90
1906.....	17.32	17.29	17.26	17.25	17.24	17.38	17.57	17.96	18.44	20.06	21.96	22.75
1905.....	16.85	16.45	16.35	16.30	16.20	15.65	15.00	15.40	15.90	16.50	17.70	18.10
1904.....	13.60	13.35	13.85	14.10	13.60	12.60	12.50	12.65	12.75	13.35	15.25	16.60
1903.....	22.35	22.35	22.00	21.60	20.00	19.85	19.00	17.85	16.35	15.85	15.25	14.35
1902.....	16.70	16.93	17.56	18.37	20.95	21.25	22.00	21.75	21.75	21.95	22.25	22.12
1901.....	13.25	13.60	16.56	16.69	16.65	15.94	16.00	15.90	15.71	15.90	16.10	16.35
1900.....	24.90	24.90	24.90	24.90	24.90	19.75	18.00	16.05	14.00	13.25	13.65	13.55
1899.....	11.00	11.75	14.00	15.15	16.25	19.00	20.75	22.00	23.50	24.00	24.50	25.00
1898.....	9.90	10.15	10.40	10.50	10.50	10.40	10.35	10.40	10.40	10.30	10.20	10.65
1897.....	10.50	10.65	10.50	10.00	9.35	9.35	9.00	9.05	10.00	10.25	10.25	9.90
1896.....	12.30	12.80	12.00	13.15	12.75	12.40	12.20	11.45	11.25	11.50	12.30	11.40
1895.....	10.00	10.15	10.25	10.75	11.25	12.00	14.00	14.75	17.25	15.75	14.00	12.25

No. 2 Foundry, f.o.b. Valley, 1904-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$17.25	$17.25	$17.25	$17.25	$17.10	$16.75	$16.50	$16.50	$16.85	$17.00	$17.70	$18.00
1927.....	18.43	18.06	18.37	18.50	18.50	18.20	17.50	17.50	17.50	17.50	17.45	17.25
1926.....	20.50	20.50	20.50	19.30	19.00	18.00	17.80	17.50	17.70	18.35	19.60	19.00
1925.....	22.25	22.00	21.25	20.20	18.85	18.50	18.50	18.75	19.20	20.40	00.00	20.50
1924.....	22.40	23.00	22.50	21.75	20.90	19.50	19.00	19.25	19.50	19.50	19.60	20.50
1923.....	27.00	27.00	29.60	31.00	30.15	27.75	25.60	24.70	24.75	23.40	22.00	22.00
1922.....	20.05	19.20	19.20	20.55	23.95	24.20	24.20	31.00	35.25	31.85	28.40	25.00
1921.....	31.10	28.20	26.20	25.05	23.80	22.50	20.30	20.10	21.20	21.20	20.05	20.35
1920.....	40.90	42.40	43.40	44.20	45.40	45.40	46.40	49.65	50.95	48.95	42.95	37.20
1919.....	31.00	31.00	29.10	26.75	26.75	28.15	28.15	28.15	29.50	34.95	33.35	38.15
1918.....	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917.....	32.35	34.25	37.20	39.90	42.95	51.40	55.90	54.70	49.05	33.00	33.00	33.00
1916.....	18.90	18.75	18.75	18.90	18.70	18.50	18.50	18.50	18.65	20.75	26.10	31.30
1915.....	13.25	13.25	13.25	12.95	12.75	12.75	12.85	13.95	14.75	14.85	15.90	17.50
1914.....	12.89	13.25	13.40	13.50	13.50	13.50	13.50	13.30	13.25	13.10	12.90	13.05
1913.....	17.50	17.30	16.75	15.80	14.80	14.15	13.85	13.80	14.00	13.90	13.90	13.50
1912.....	13.00	13.10	13.20	13.35	13.30	13.30	13.50	13.85	14.50	16.15	17.30	17.50
1911.....	13.75	13.75	13.85	13.85	14.75	13.60	13.50	13.50	13.50	13.50	13.15	12.80
1910.....	17.00	16.55	16.10	15.75	15.35	14.65	14.20	14.10	14.40	13.95	13.75	13.75
1909.....	15.35	15.00	14.85	14.25	14.35	14.85	15.25	15.35	16.25	17.10	17.25	17.25
1908.....	16.35	16.00	15.70	15.10	14.50	15.35	15.10	15.00	14.60	14.20	15.50	15.50
1907.....	23.30	24.00	24.00	24.00	24.50	24.50	23.15	22.55	21.30	20.05	19.15	17.05
1906.....	17.55	17.25	17.15	16.75	16.65	16.25	16.50	18.00	19.00	20.50	23.00	23.75
1905.....	16.50	16.15	16.00	16.15	15.75	14.35	14.35	14.55	14.75	15.65	16.85	17.25
1904.....	12.50	12.25	13.00	12.90	12.15	11.65	11.50	11.65	11.75	12.40	15.00	16.00

No. 2 Foundry, f.o.b. Chicago, 1895-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$18.50	$18.50	$18.50	$18.50	$18.20	$18.00	$17.60	$17.60	$18.25	$18.80	$20.00	$20.00
1927.....	20.90	20.25	20.00	20.00	20.00	20.00	20.00	19.50	19.50	18.75	18.50	18.50
1926.....	23.00	23.00	23.00	22.00	21.65	21.10	21.00	21.00	21.00	21.00	21.00	21.00
1925.....	23.80	24.00	24.00	22.60	21.25	20.25	20.30	20.50	21.10	21.60	22.75	23.00
1924.....	23.70	24.40	24.50	24.40	22.80	21.40	19.80	20.40	20.50	20.50	21.00	22.00
1923.....	28.80	29.75	31.25	32.50	32.50	31.25	28.00	27.10	26.75	25.60	23.30	23.00
1922.....	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.00
1921.....	32.75	28.65	25.80	24.25	23.00	21.10	19.15	19.60	21.75	21.50	21.00	20.00
1920.....	40.00	42.25	43.00	43.00	43.00	43.00	44.40	46.00	46.00	46.00	42.40	36.50
1919.....	31.00	31.00	29.95	26.75	26.75	26.75	26.75	26.75	26.75	31.75	31.75	38.30
1918.....	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917.....	30.00	31.25	35.70	39.25	43.20	51.00	55.00	55.00	49.50	33.00	33.00	33.00
1916.....	18.50	18.50	18.70	19.00	19.00	19.00	19.00	19.00	18.65	19.15	25.00	29.25
1915.....	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	13.80	14.45	17.10	18.00
1914.....	14.25	14.20	14.25	14.25	14.25	14.20	14.00	14.00	13.65	13.30	13.00	13.00
1913.....	18.00	18.00	17.60	17.25	16.70	16.10	15.20	15.00	15.00	15.00	15.00	14.50
1912.....	14.00	14.00	14.00	14.25	14.50	14.50	14.60	15.30	16.35	17.30	17.85	18.00
1911.....	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.50	14.50	14.50	14.00	14.00
1910.....	19.00	18.75	18.25	17.00	16.75	16.50	16.50	16.50	16.50	16.00	16.00	16.00
1909.....	17.45	16.75	16.50	16.45	16.20	16.40	16.90	17.35	18.20	18.85	19.00	19.00
1908.....	18.25	17.85	17.40	17.20	17.00	17.30	17.00	17.00	16.75	16.50	16.75	17.35
1907.....	26.00	26.50	26.75	27.50	27.40	26.50	25.40	24.50	23.60	22.60	20.60	19.00
1906.....	19.25	19.25	19.00	18.75	18.50	18.10	18.30	18.90	19.75	21.50	26.50	27.00
1905.....	17.50	17.50	17.50	17.50	17.25	16.60	16.15	16.35	16.50	17.55	18.90	19.50
1904.....	14.10	13.75	13.55	14.00	13.80	13.40	13.30	13.35	13.40	13.70	15.60	16.60
1903.....	25.00	24.00	24.00	23.00	21.70	20.50	18.50	17.50	16.85	15.90	14.50	14.30
1902.....	15.80	16.75	18.60	19.75	21.75	22.50	23.40	24.65	27.15	27.15	26.90	25.40
1901.....	14.60	14.10	15.20	15.50	15.50	15.50	15.50	15.20	15.00	15.00	15.00	15.50
1900.....	24.50	24.50	23.75	23.25	22.00	20.25	17.75	15.50	14.50	14.00	14.25	14.60
1899.....	11.25	12.00	14.25	15.00	15.25	17.00	17.00	20.00	22.00	23.00	23.50	24.50
1898.....	10.50	10.50	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1897.....	11.00	10.75	10.75	10.75	10.25	10.00	10.00	10.00	10.25	10.75	10.75	10.50
1896.....	13.50	12.25	12.00	12.00	11.75	11.25	11.25	11.20	10.80	10.75	11.10	11.25
1895.....	9.75	9.75	9.75	10.00	10.25	10.75	12.50	13.50	13.50	14.50	14.50	14.00

Market History —

Southern No. 2, f.o.b. Birmingham, 1904-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$16.00	$16.00	$16.00	$16.00	$16.00	$15.90	$15.50	$15.65	$16.25	$16.25	$16.30	$16.50
1927.....	18.50	18.00	18.00	18.00	18.00	18.00	17.43	17.25	17.25	17.25	16.00	16.00
1926.....	22.75	22.00	22.00	22.00	22.00	21.00	21.00	21.00	20.80	20.00	20.00	20.00
1925.....	20.10	20.75	21.00	20.00	20.00	19.00	18.00	18.00	18.50	19.50	21.00	21.20
1924.....	21.60	23.00	23.00	22.20	21.60	20.00	18.20	17.90	17.65	17.50	17.90	19.50
1923.....	23.30	24.50	26.50	27.00	27.00	26.75	25.00	23.60	22.75	20.20	19.25	21.00
1922.....	16.15	19.25	15.25	16.00	17.60	18.50	18.50	20.70	26.25	27.40	24.00	22.50
1921.....	33.75	27.70	25.10	23.00	22.50	21.70	20.25	19.00	19.00	19.00	18.25	17.00
1920.....	38.20	40.00	40.00	40.00	42.00	42.30	42.30	42.00	42.00	42.00	39.50	38.00
1919.....	31.00	31.00	30.00	26.75	26.25	25.25	25.00	26.75	26.75	27.45	30.65	35.15
1918.....	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	35.25
1917.....	23.00	24.50	28.00	35.80	35.75	35.75	46.00	48.00	43.50	33.50	33.50	33.50
1916.....	14.50	14.65	15.00	15.00	15.00	14.45	14.00	13.60	14.40	15.15	19.60	23.00
1915.....	9.50	9.50	9.40	9.35	9.75	9.55	9.60	11.00	11.30	11.75	13.15	14.20
1914.....	10.50	10.50	10.60	10.50	10.50	10.45	10.05	10.00	10.00	10.00	9.90	9.50
1913.....	13.70	13.50	13.00	12.50	11.75	10.60	10.50	11.00	11.00	11.00	10.75	11.00
1912.....	10.00	10.00	10.05	10.50	10.95	11.00	11.25	11.65	12.50	13.45	13.75	13.50
1911.....	11.00	11.00	11.00	11.00	10.75	10.25	10.00	10.05	10.10	10.00	9.75	10.00
1910.....	14.00	13.90	13.00	12.10	11.80	11.60	11.40	11.00	11.00	11.00	11.00	11.00
1909.....	13.00	12.70	11.75	11.00	11.00	11.30	12.30	13.00	14.00	14.50	14.50	14.00
1908.....	12.80	12.50	12.10	11.90	11.50	12.00	11.60	12.05	12.50	12.50	12.50	13.00
1907.....	23.00	23.00	22.75	22.00	21.40	21.25	20.50	19.80	18.10	17.65	16.00	14.90
1906.....	14.00	14.00	13.70	13.65	13.75	13.50	13.00	14.15	16.00	17.15	21.25	22.00
1905.....	13.50	13.50	13.50	13.25	12.75	11.85	11.00	11.65	11.75	12.50	14.00	14.00
1904.....	9.75	9.50	9.70	10.00	9.65	9.15	9.15	9.50	9.50	10.65	12.75	13.05

Malleable, f.o.b. Chicago, 1913-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$18.50	$18.50	$18.50	$18.50	$18.20	$18.00	$17.60	$17.60	$18.25	$18.80	$20.00	$20.00
1927.....	20.90	20.25	20.00	20.00	20.00	20.00	20.00	19.50	19.50	18.75	18.50	18.50
1926.....	23.00	23.00	23.00	22.00	21.65	21.10	21.00	21.00	21.00	21.00	21.00	21.00
1925.....	24.00	24.00	24.00	22.70	21.25	20.25	20.50	20.50	21.10	21.60	22.75	23.00
1924.....	23.70	24.40	24.50	24.40	22.80	21.40	19.80	20.40	20.50	20.50	21.00	22.00
1923.....	28.80	29.75	31.25	32.50	32.50	31.25	28.00	27.10	26.75	25.60	23.30	23.00
1922.....	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.25
1921.....	33.25	29.00	26.25	24.75	23.50	21.20	19.15	19.40	21.75	21.20	21.00	20.00
1920.....	40.50	42.75	43.50	43.50	43.50	43.50	44.90	46.50	46.50	46.50	43.00	37.50
1919.....	31.50	31.50	30.45	27.25	27.25	27.25	27.25	27.25	27.25	28.00	32.25	38.80
1918.....	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	34.50	34.50	34.50
1917.....	30.00	31.25	35.80	39.00	43.20	50.50	55.00	55.00	49.50	33.35	33.50	33.50
1916.....	19.00	19.00	19.00	19.50	19.50	19.50	19.50	19.50	19.15	19.50	25.00	29.25
1915.....	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	14.20	15.10	17.40	18.00
1914.....	14.25	14.25	14.25	14.25	14.25	14.25	14.00	14.00	13.50	13.50	13.00	13.00
1913.....	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.40

No. 2X Foundry, Delivered, Philadelphia, 1910-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$20.51	$20.91	$21.26	$21.26	$21.26	$21.26	$20.76	$20.76	$21.01	$21.76	$21.51	$21.76
1927.....	22.76	22.26	22.26	22.26	22.26	22.01	21.51	21.26	21.01	20.66	20.51	20.26
1926.....	24.26	24.01	23.26	23.26	23.01	22.76	22.26	22.01	22.26	22.51	23.51	23.76
1925.....	25.61	25.26	24.51	23.16	21.76	21.51	21.26	21.76	21.86	22.61	24.01	24.26
1924.....	24.26	24.26	24.13	23.73	22.60	21.76	21.76	21.76	21.26	21.36	22.98	24.88
1923.....	29.56	30.10	32.00	32.75	32.75	30.60	28.00	25.80	26.20	24.50	23.00	24.26
1922.....	21.55	21.35	23.60	23.75	25.60	27.20	27.90	32.15	34.25	33.00	30.50	28.45
1921.....	35.00	31.00	27.40	26.25	26.10	26.00	23.50	21.00	21.40	22.00	22.50	22.10
1920.....	43.90	45.00	45.68	46.80	46.90	46.90	48.55	50.95	53.75	52.65	46.75	38.95
1919.....	36.15	36.15	35.10	31.00	30.10	29.60	29.50	29.60	29.95	32.00	35.85	40.75
1918.....	34.25	34.25	34.25	34.25	34.25	34.25	34.50	34.50	34.50	38.85	39.15	39.15
1917.....	30.50	31.75	36.90	41.75	43.35	47.50	54.35	53.40	47.80	34.00	34.00	34.00
1916.....	19.75	20.00	20.00	20.75	20.50	19.75	19.75	19.75	19.75	20.50	25.25	30.00
1915.....	14.25	14.25	14.25	14.25	14.00	14.25	14.50	15.25	16.25	16.50	17.50	19.25
1914.....	14.75	15.00	15.00	15.00	14.75	14.75	14.75	14.75	14.75	14.50	14.25	14.25
1913.....	18.25	18.00	17.75	17.50	17.00	16.25	15.50	15.75	16.00	15.75	15.50	15.00
1912.....	15.00	15.00	15.00	15.25	15.25	15.50	15.75	16.00	16.50	17.50	18.00	18.25
1911.....	15.50	15.50	15.75	15.50	15.25	15.00	15.00	15.00	15.00	15.00	14.85	14.75
1910.....	19.00	18.40	18.25	17.75	17.25	16.75	16.00	16.00	16.00	15.75	15.50	15.50

Lake Superior Charcoal, Delivered, Chicago, 1907-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04	$27.04
1927.....	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.07	27.04	27.04
1926.....	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	27.04	27.04	27.04
1925.....	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04
1924.....	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04
1923.....	33.15	33.53	35.53	36.55	36.55	36.65	36.62	32.10	32.04	30.04	28.65	29.04
1922.....	31.50	30.50	26.90	26.50	28.40	30.00	31.65	33.75	36.15	36.15	36.15	36.15
1921.....	40.25	38.50	38.50	38.50	38.50	38.50	36.87	34.30	33.25	32.50	32.25	31.50
1920.....	48.75	55.65	57.50	57.50	57.50	57.50	57.50	57.50	58.30	58.50	58.50	53.50
1919.....	38.70	38.70	38.70	33.25	31.75	31.75	31.75	32.75	32.75	33.15	35.50	41.00
1918.....	37.50	37.50	37.50	37.50	37.50	37.50	37.70	37.70	37.70	37.70	38.70	38.70
1917.....	33.75	34.50	37.55	42.25	49.25	51.80	59.50	59.50	59.50	48.50	37.50	37.50
1916.....	19.25	19.50	19.75	19.75	19.75	19.75	19.75	19.75	19.75	20.35	21.95	31.75
1915.....	15.75	15.75	15.75	15.75	15.25	15.25	15.75	15.75	15.95	16.25	17.50	19.25
1914.....	15.50	15.50	15.50	15.50	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75
1913.....	18.25	18.00	18.00	18.00	18.00	16.75	16.75	15.00	15.00	15.75	15.50	15.50
1912.....	16.50	16.50	16.50	15.50	15.75	15.75	16.25	16.75	17.75	18.75	18.75	18.75
1911.....	17.50	17.50	17.50	17.50	17.00	17.00	17.00	17.00	17.00	17.00	16.50	16.50
1910.....	19.50	19.50	19.00	19.00	19.00	18.50	18.50	18.50	18.50	18.00	18.00	17.50
1909.....	19.50	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70
1908.....	22.80	21.50	21.50	21.10	19.85	19.50	19.50	19.50	19.50	19.50	19.50	19.50
1907.....	25.50	26.75	25.50	26.00	27.10	27.40	27.10	27.00	26.75	26.10	25.25	23.50

Market History —

Basic, Delivered, Eastern Pennsylvania, 1909-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$19.50	$19.50	$19.50	$19.25	$19.10	$19.10	$19.00	$19.00	$19.00	$19.75	$19.75	$19.75
1927.....	21.25	21.00	21.00	20.90	20.75	20.75	20.50	19.75	19.75	19.50	19.50	19.25
1926.....	22.75	22.50	22.20	21.76	21.76	21.76	21.00	21.00	20.76	21.00	22.50	22.75
1925.....	24.25	24.20	24.05	22.65	21.45	21.50	21.50	20.55	20.50	20.50	22.70	23.00
1924.....	22.50	22.50	21.50	21.35	20.75	20.60	20.50	20.00	20.00	20.00	21.46	22.50
1923.....	27.70	28.15	29.35	30.75	30.75	28.15	27.25	25.10	25.10	24.00	22.60	23.30
1922.....	20.25	19.85	19.90	21.70	24.55	25.25	26.00	29.50	30.00	30.25	28.00	27.65
1921.....	33.35	29.95	26.20	25.00	25.00	24.70	22.25	20.70	19.50	20.50	20.90	20.25
1920.....	39.75	40.50	43.00	43.70	44.00	44.05	44.10	47.45	51.15	50.75	44.55	34.75
1919.....	33.90	33.90	32.85	29.65	28.80	25.50	26.60	27.00	27.00	27.90	33.00	35.75
1918.....	33.90	33.90	33.90	32.90	32.90	32.90	32.90	32.90	32.90	36.60	36.90	36.90
1917.....	30.15	30.50	33.80	38.25	40.80	46.40	50.75	51.00	46.50	33.50	33.50	33.50
1916.....	19.50	19.50	20.00	20.50	20.00	19.25	19.00	19.25	20.00	21.00	25.50	30.50
1915.....	13.50	13.75	14.00	13.25	13.50	13.50	13.75	15.25	17.25	17.50	17.75	18.00
1914.....	14.00	14.25	14.25	14.25	14.00	14.00	14.00	14.00	14.00	14.00	13.50	13.50
1913.....	18.25	18.00	17.50	16.50	16.50	16.00	15.25	15.00	15.25	15.25	15.00	14.25
1912.....	14.25	14.25	14.25	15.00	15.00	15.25	15.50	16.25	16.50	17.50	18.00	18.25
1911.....	14.50	15.00	15.25	15.25	14.75	14.50	14.50	14.50	14.50	14.50	14.25	14.25
1910.....	18.75	18.50	18.00	17.50	16.25	15.75	15.50	15.00	15.00	14.50	14.50	14.50
1909.....	16.40	16.10	15.85	15.05	15.00	15.85	15.90	16.15	16.80	17.85	18.36	18.15

Southern Ohio No. 2, f.o.b. Ironton, 1913-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$18.60	$18.20	$18.50
1927.....	19.90	20.00	20.00	20.00	20.00	19.80	19.00	19.00	19.00	19.00	19.00	19.00
1926.....	21.40	20.60	21.00	20.40	20.00	19.50	19.50	19.90	20.00	20.00	20.00	20.00
1925.....	22.00	22.00	21.60	21.00	19.50	18.75	19.00	19.35	19.50	19.60	21.00	21.00
1924.....	22.90	24.00	23.50	23.00	22.50	20.25	19.50	19.75	20.00	20.00	20.90	22.00
1923.....	27.90	28.40	30.75	31.00	31.00	28.25	26.50	26.00	24.90	23.90	22.50	22.50
1922.....	19.60	19.15	19.00	20.30	22.70	23.25	24.15	27.00	33.75	32.40	29.25	27.00
1921.....	34.60	30.00	27.50	25.85	24.50	22.80	20.50	20.15	20.30	21.00	20.50	20.00
1920.....	39.50	43.00	43.25	43.25	44.00	44.00	44.00	46.50	46.80	46.00	44.00	37.25
1919.....	31.00	31.00	29.95	26.75	26.75	26.75	26.75	26.75	26.75	28.80	31.75	36.55
1918.....	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917.....	30.00	30.75	35.80	37.75	41.20	47.50	54.50	55.00	49.25	33.00	33.00	33.00
1916.....	18.30	18.50	18.30	18.50	18.50	18.15	18.45	18.40	18.15	19.40	24.00	30.00
1915.....	12.75	12.75	12.75	12.75	12.56	12.50	12.60	13.65	14.20	14.90	16.15	17.00
1914.....	13.00	13.00	13.25	13.50	13.50	13.50	13.00	13.50	13.00	13.00	12.65	12.65
1913.....	17.90	17.50	17.20	16.85	16.20	15.90	15.40	15.20	15.20	14.75	14.70	13.50

Standard Low Phosphorus, Del. Eastern Pennsylvania, 1911-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$24.76	$24.76	$24.76	$24.76	$24.76	$24.51	$24.51	$24.51	$24.26	$24.26	$24.26	$24.26
1927.....	25.76	25.76	25.76	25.76	25.76	25.76	25.76	25.26	25.26	25.26	24.76	24.76
1926.....	24.76	24.76	24.76	24.76	24.76	24.26	24.26	24.26	24.51	24.76	25.76	25.76
1925.....	26.76	26.76	26.76	26.26	25.26	25.26	25.26	25.26	24.01	24.51	24.76	24.76
1924.....	27.76	27.76	26.76	26.86	27.26	27.26	27.26	26.26	26.26	26.26	26.76	29.79
1923.....	29.75	31.35	35.45	35.45	35.80	34.80	33.80	32.80	30.50	30.50	30.00	29.76
1922.....	35.00	34.00	34.00	34.00	35.35	35.35	35.15	38.00	40.00	40.00	40.00	40.00
1921.....	47.70	46.80	46.80	44.15	43.30	43.30	43.30	43.30	43.30	43.30	43.30	35.30
1920.....	51.60	53.55	53.80	53.80	54.80	60.20	57.80	59.60	65.30	65.30	*65.30	*65.30
1919.....	51.00	51.00	49.90	46.75	45.80	42.25	41.10	40.25	40.25	40.35	43.00	47.50
1918.....	55.50	55.50	55.50	55.50	55.50	55.50	56.00	56.00	56.00	57.00	57.00	57.00
1917.....	54.50	57.50	66.70	75.50	77.00	85.00	92.50	92.50	82.00	55.50	55.50	55.50
1916.....	32.00	32.00	32.00	33.00	34.00	34.00	33.00	33.00	34.00	40.00	46.00	55.00
1915.....	19.00	19.00	20.00	20.00	20.00	20.50	21.50	23.50	24.50	28.00	30.00	32.00
1914.....	21.00	21.00	21.00	21.00	21.00	20.50	20.50	21.00	21.00	21.00	19.00	19.00
1913.....	24.50	24.50	24.00	23.50	23.50	23.50	23.50	23.00	23.00	23.00	21.50	21.00
1912.....	19.25	19.00	19.00	19.50	19.75	19.75	20.00	21.00	21.50	22.50	24.00	24.50
1911.....	21.50	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.25	19.50	19.25

*Nominal.

No. 2X Foundry, f.o.b. Buffalo, 1913-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$17.50	$18.00	$19.00	$19.00
1927.....	19.75	18.90	18.15	18.00	18.00	17.90	17.50	17.45	18.00	18.00	17 60	17.50
1926.....	21.50	21.50	21.50	21.50	21.25	20.50	19.80	20.00	20.00	20.00	20.00	20.00
1925.....	23.50	22.75	22.50	20.90	19.25	19.00	19.00	19.00	19.00	19.50	21.25	21.50
1924.....	23.10	22.75	22.00	21.50	20.50	19.90	19.30	19.10	19.50	19.60	20.90	22.00
1923.....	28.00	28.50	29.40	30 10	29.80	29.50	26.60	25.50	25.25	23.00	20.70	22.00
1922.....	19.80	19.15	18.30	20.75	23.00	23.85	25.35	31.50	33.75	31.50	27.85	26.00
1921.....	33.75	31.25	28.25	26.75	26.25	23.85	21.75	21.25	21.05	20.40	20.00	20.00
1920.....	41.50	44.60	45.15	46.25	46.25	46.25	46.25	48.75	51.25	51.25	46.00	48.25
1919.....	32.25	32.25	31.45	28.00	28.00	28.00	28.00	28.70	28.75	29.90	34.45	39.50
1918...	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	35.25
1917.....	35.00	35.00	38.15	40.00	42.75	49.15	53.50	54.00	49.05	33.50	33.50	33.50
1916.....	18.50	18.60	18.85	19.15	19.00	18.75	18.75	18.75	18.90	20.70	26.65	33.65
1915.....	13.15	13.05	12.55	12.75	12.75	12.75	12.80	13.70	15.15	15.80	16.70	18.00
1914.....	13.00	13.00	13.75	13.90	13.50	13.05	13.05	13.20	13.25	12.60	12.45	13.10
1913.....	17.25	17.00	17.00	16.50	15.50	14.75	14.00	14.00	14.25	14.00	14.00	14.00

No. 2X f.o.b. Virginia Furnace, 1911-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$20.50	$20.50	$20.50	$20.50	$20.50	$20.50	$20.50	$20.50	$20.50	$20.50	$20.50	$21.25
1927.....	21.75	22.00	22.00	22.00	22.00	22.00	22.00	21.50	21.50	21.50	21.25	21.00
1926.....	23.50	23.25	23.25	23.25	23.00	23.00	22.75	22.75	23.00	22.50	22.75	23.00
1925.....	24.50	24.50	24.50	23.90	23.35	23.00	23.00	23.00	23.00	23.00	23.00	23.30
1924.....	25.00	25.75	26.00	25.50	25.50	25.50	24.50	24.50	24.50	24.50	24.50	25.00
1923.....	27.50	27.50	28.25	29.25	28.60	28.00	27.25	26.25	25.50	25.00	25.00	24.50
1922.....	21.75	22.00	22.50	22.85	23.50	24.50	26.00	26.00	33.00	33.00	31.40	27.75
1921.....	34.50	31.25	28.05	27.10	27.00	26.00	24.50	24.00	23.00	23.25	22.80	22.50
1920.....	41.25	42.75	43.25	44.25	45.75	46.25	46.75	49.25	50.25	49.75	45.75	42.05
1919.....	35.25	33.00	31.55	28.45	27.50	26.50	26.50	28.25	29.25	30.35	33.40	38.25
1918.....	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	37.50	38.00	38.00
1917.....	26.50	28.25	34.25	38.30	41.00	46.50	52.25	51.90	46.50	33.50	33.50	33.50
1916.....	17.25	18.00	18.25	18.50	18.50	18.50	18.50	18.50	17.50	18.50	23.75	27.00
1915.....	12.50	12.50	12.50	12.50	12.50	12.50	12.50	13.00	13.50	14.00	15.50	17.00
1914.....	12.75	12.75	12.75	12.75	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50
1913.....	16.00	15.50	15.50	15.00	14.50	13.75	13.00	13.00	13.00	13.00	13.00	12.75
1912.....	12.25	12.25	12.25	13.00	13.00	13.25	13.50	14.00	14.50	15.50	16.00	16.00
1911.....	12.75	12.75	13.00	13.00	13.00	12.25	12.25	12.25	12.25	12.25	12.25	12.25

Market History —

Semifinished Material

Per Gross Ton f.o.b.

Bessemer Billets, Pittsburgh, 1895-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928	$33.00	$33.00	$33.00	$33.00	$33.00	$32.50	$32.25	$32.00	$32.00	$32.75	$33.00	$33.00
1927	35.00	34.00	33.60	33.50	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
1926	35.50	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1925	37.40	37.60	37.75	35.80	35.35	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1924	40.00	40.00	40.00	40.00	39.20	38.00	38.00	38.00	37.10	36.60	35.50	35.50
1923	37.50	38.85	44.50	46.00	45.00	42.90	42.50	42.50	42.50	41.50	41.50	40.00
1922	29.00	28.00	28.30	30.10	34.50	35.00	35.00	35.00	39.50	40.00	38.80	36.50
1921	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	39.00	29.00
1920	49.60	61.25	65.00	68.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	62.50	64.85	69.30	75.20	88.65	95.60	102.25	92.25	74.05	58.75	47.50	47.50
1916	34.05	35.50	41.10	46.25	46.10	43.00	42.50	45.15	47.50	48.10	53.10	59.50
1915	19.75	20.00	20.00	20.00	20.05	20.35	21.45	23.00	24.70	25.20	27.10	30.75
1914	20.00	20.90	21.05	21.05	20.00	19.80	19.55	20.05	21.00	20.40	19.25	18.85
1913	28.90	28.90	29.00	29.00	27.80	26.75	26.75	26.30	25.00	23.00	21.10	20.10
1912	20.00	20.00	19.90	20.00	21.10	21.90	22.25	22.40	23.75	25.70	26.75	27.00
1911	23.00	23.00	23.00	23.00	23.00	21.00	21.00	21.00	21.00	20.00	19.70	19.25
1910	27.87	27.50	27.50	27.00	26.10	25.50	25.00	25.00	24.50	23.40	23.00	23.00
1909	25.00	23.50	23.00	22.00	22.50	23.00	24.00	25.00	26.00	26.50	27.50	27.50
1908	28.00	28.00	28.00	28.00	28.00	26.50	25.00	25.00	25.00	25.00	25.00	25.00
1907	29.75	29.50	29.25	29.75	30.25	31.00	30.00	30.00	29.50	28.50	28.00	28.00
1906	27.00	27.50	27.65	27.75	27.00	26.25	27.00	28.00	28.50	28.50	29.00	29.75
1905	21.00	24.90	24.60	25.50	23.50	22.00	22.00	23.50	25.75	25.95	26.30	26.50
1904	23.00	23.00	23.00	23.00	22.00	21.50	21.00	20.00	19.50	19.50	21.00	21.00
1903	29.75	30.00	30.25	31.00	30.50	29.50	27.50	27.00	27.00	26.50	23.50	23.00
1902	28.05	29.80	31.35	32.25	33.90	35.20	33.50	32.10	31.50	29.80	29.00	29.25
1901	19.70	19.75	20.80	24.10	24.20	24.45	24.25	24.40	24.10	26.80	28.25	27.60
1900	35.00	35.00	35.00	34.50	29.00	27.25	22.50	18.00	17.50	17.50	19.30	19.75
1899	16.75	18.25	24.00	25.50	27.00	31.50	33.50	36.50	39.00	37.50	36.00	35.00
1898	15.00	15.00	15.25	15.25	14.85	14.75	14.75	15.45	16.10	15.75	15.25	16.00
1897	15.25	15.50	15.50	14.75	14.00	14.25	14.00	14.15	15.75	16.50	15.75	15.00
1896	17.05	17.65	17.50	18.90	19.50	19.75	19.90	19.75	19.60	20.25	20.00	17.00
1895	14.85	15.00	14.85	15.40	16.75	18.75	20.85	22.00	24.25	22.00	19.50	17.00

Open-Hearth Billets, Pittsburgh, 1910-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928	$33.00	$33.00	$33.00	$33.00	$33.00	$32.50	$32.25	$32.00	$32.00	$32.75	$33.00	$33.00
1927	35.00	34.00	33.60	33.50	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
1926	35.50	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1925	37.75	37.65	37.75	35.80	35.40	35.90	35.00	35.00	35.00	35.00	35.00	35.00
1924	40.00	40.00	40.00	40.00	39.20	38.00	38.00	38.00	37.10	36.60	35.50	35.50
1923	37.50	38.85	44.50	46.00	45.00	42.90	42.50	42.50	42.50	41.50	41.50	40.00
1922	29.00	28.00	28.30	30.10	34.50	35.00	35.00	35.00	39.50	40.00	38.80	36.50
1921	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
1920	49.60	61.25	66.25	70.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	60.00	62.50	67.00	72.50	85.00	93.75	100.00	93.00	73.75	58.75	47.50	47.50
1916	34.75	35.00	40.60	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	19.50	19.50	19.50	19.50	19.50	19.85	21.50	24.00	25.60	26.50	28.00	30.20
1914	20.00	20.75	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
1913	28.70	29.40	29.50	29.50	28.10	26.50	26.50	26.10	25.00	23.00	20.85	20.00
1912	19.75	19.50	19.40	20.25	21.00	21.25	21.75	21.75	21.75	21.75	21.75	28.00
1911	23.00	23.00	23.00	23.00	22.00	21.00	21.00	21.00	20.25	19.50	19.75	19.25
1910	28.00	28.00	28.50	28.75	28.75	27.00	26.50	26.00	25.00	24.00	23.25	23.00

Wire Rods, Pittsburgh, 1912-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928	$41.50	$43.50	$44.00	$44.00	$44.00	$44.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00
1927	45.00	43.50	43.00	42.50	42.00	42.00	43.00	43.00	43.00	42.50	41.00	40.00
1926	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
1925	48.00	48.00	48.00	47.75	46.00	45.25	45.00	45.00	45.00	45.00	45.00	45.30
1924	51.00	51.00	51.00	51.00	48.40	48.00	48.00	46.00	45.75	45.00	45.50	48.00
1923	45.00	47.50	47.00	46.60	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1922	37.00	35.75	35.80	38.00	38.00	38.00	39.50	40.00	45.00	45.00	46.50	46.50
1921	57.00	57.00	52.00	50.00	48.00	47.00	42.25	42.00	40.80	40.00	38.00	38.00
1920	52.00	56.00	62.50	70.00	70.00	70.00	70.00	70.00	70.00	75.00	72.50	57.00
1919	57.00	57.00	55.75	52.00	52.00	52.00	52.00	52.00	52.00	52.00	56.00	62.00
1918	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.25	57.50	57.50	57.50
1917	73.75	75.00	75.00	83.75	88.00	92.50	95.00	96.00	90.00	73.50	57.00	57.00
1916	46.25	50.00	51.00	55.00	60.00	60.00	58.75	55.00	55.00	55.00	64.00	69.00
1915	25.00	25.00	25.00	25.00	25.00	25.00	25.60	26.75	28.50	30.00	34.50	39.00
1914	25.50	25.90	26.00	26.00	26.00	25.50	24.80	24.50	25.60	26.00	25.75	25.00
1913	30.00	30.00	30.00	30.00	30.00	29.50	28.60	27.60	27.50	26.80	26.00	25.75
1912	24.65	25.30	25.50	25.50	25.90	25.35	25.65	26.00	26.25	27.80	29.60	30.00

Open-Hearth Sheet Bars, Pittsburgh, 1913-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928	$34.00	$34.00	$33.70	$34.00	$34.00	$33.50	$32.25	$32.20	$33.00	$33.00	$33.60	$34.00
1927	36.00	35.00	34.00	33.75	33.75	33.50	33.50	33.50	33.90	34.00	34.00	34.00
1926	36.50	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
1925	39.25	39.00	38.25	37.00	36.25	35.00	35.00	35.00	35.00	35.00	35.00	36.80
1924	42.50	42.50	42.50	42.10	40.60	40.00	39.20	38.00	37.50	37.20	37.00	37.00
1923	37.50	39.25	44.50	45.85	45.40	42.90	42.50	42.50	42.50	42.50	42.50	42.50
1922	30.00	29.00	29.40	31.50	35.00	35.00	35.00	35.00	39.50	39.85	38.80	36.50
1921	47.00	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
1920	53.40	65.00	72.50	78.00	78.75	75.00	75.00	71.25	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	42.00	45.00	48.00
1918	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1917	60.00	62.50	67.50	72.00	88.00	101.25	105.00	96.00	82.50	65.50	57.00	51.00
1916	34.75	35.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	59.00
1915	20.00	20.00	20.00	19.60	20.00	20.35	22.00	25.00	25.80	26.50	28.50	30.80
1914	20.60	21.75	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	29.20	29.90	30.00	30.00	28.80	27.50	27.50	27.10	25.60	23.80	21.75	21.00

Market History —

Bessemer Sheet Bars, Pittsburgh, 1913-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$34.00	$34.00	$33.70	$34.00	$34.00	$33.50	$32.25	$32.20	$33.00	$33.00	$33.60	$34.00
1927.....	36.00	35.00	34.00	33.75	33.75	33.50	33.50	33.50	33.90	34.00	34.00	34.00
1926.....	36.50	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
1925.....	39.20	39.00	38.50	37.00	36.25	35.00	35.00	35.00	35.00	35.00	35.00	36.80
1924.....	42.50	42.50	42.50	42.10	40.60	40.00	39.20	38.00	37.50	37.20	37.00	37.00
1923.....	37.50	39.25	44.50	45.85	45.40	42.90	42.50	42.50	42.50	42.50	42.50	42.50
1922.....	30.00	29.00	29.40	31.50	35.00	35.00	35.00	35.00	39.50	39.85	38.80	36.50
1921.....	47.00	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
1920.....	53.40	65.00	70.00	70.00	75.00	70.00	70.00	70.00	68.50	63.75	56.25	47.65
1919.....	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	42.00	45.00	48.00
1918.....	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00
1917.....	60.00	62.50	67.50	72.00	88.00	101.25	105.00	96.00	82.50	65.50	57.00	57.00
1916.....	33.75	34.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	59.00
1915.....	20.00	20.00	20.00	19.60	20.00	20.35	22.00	25.00	25.80	26.50	28.50	30.80
1914.....	21.00	22.00	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913.....	28.70	29.40	29.50	29.50	28.40	27.50	27.50	27.10	25.60	23.80	21.75	21.00

Beehive Coke

Per Net Ton

Furnace, Spot, Connellsville, 1914-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$2.70	$2.65	$2.60	$2.60	$2.55	$2.60	$2.60	$2.75	$2.75	$2.80	$2.75	$2.75
1927.....	3.35	3.35	3.30	3.20	2.80	2.85	2.90	3.00	2.85	2.85	2.80	2.65
1926.....	6.90	7.45	3.15	3.05	2.85	2.70	2.65	2.85	3.25	3.65	4.75	3.65
1925.....	4.10	3.65	3.35	3.10	3.10	2.80	2.80	3.10	3.45	5.65	6.35	3.90
1924.....	3.80	4.00	4.05	3.55	3.25	3.15	2.85	3.00	3.00	3.00	3.00	3.35
1923.....	8.25	7.20	7.15	6.25	5.10	4.65	4.35	4.45	4.55	3.85	3.80	4.20
1922.....	2.75	2.95	3.25	4.30	6.00	6.60	10.65	13.20	11.00	10.60	7.10	6.25
1921.....	5.15	4.85	4.55	3.60	3.25	3.15	2.75	2.85	3.15	3.25	3.15	2.95
1920.....	6.00	6.00	6.00	11.20	12.00	14.50	15.20	17.75	16.90	15.15	8.40	6.25
1919.....	5.85	4.40	4.30	4.05	3.95	4.10	4.25	4.60	4.95	4.35	5.75	6.20
1918.....	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1917.....	9.05	11.20	9.40	7.60	8.35	11.40	12.10	13.70	12.10	6.00	6.00	6.00
1916.....	2.50	3.00	3.00	2.25	2.25	2.55	2.70	2.75	2.95	5.30	7.05	8.25
1915.....	1.60	1.55	1.50	1.50	1.55	1.55	1.70	1.50	1.60	1.70	2.10	2.10
1914.....	1.80	1.80	1.95	1.90	1.75	1.75	1.75	1.75	1.65	1.65	1.60	1.60

Foundry, Spot, Connellsville, 1900-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$3.75	$3.75	$3.75	$3.65	$3.55	$3.50	$3.50	$3.75	$3.75	$3.75	$3.75	$3.75
1927.....	4.25	3.85	4.15	4.05	3.80	3.90	4.00	4.00	4.00	3.75	3.75	3.65
1926.....	6.40	6.50	4.45	4.10	3.85	3.75	3.70	3.60	4.15	4.65	5.85	4.75
1925.....	5.10	4.30	3.85	3.85	3.70	3.75	3.75	3.80	4.20	5.95	6.85	5.30
1924.....	4.35	4.80	4.85	4.60	4.30	4.15	4.05	4.00	4.00	4.00	4.05	4.25
1923.....	9.00	8.60	8.15	7.80	6.10	5.50	5.15	5.20	5.70	4.80	4.85	5.15
1922.....	3.85	3.80	4.05	4.95	6.50	7.20	11.40	14.30	12.75	12.10	8.40	7.50
1921.....	6.50	6.30	6.05	5.00	4.85	4.50	4.45	4.00	4.30	4.50	4.30	4.15
1920.....	7.00	7.00	7.00	11.60	12.50	15.00	16.00	18.25	17.90	16.85	9.40	7.25
1919.....	7.05	5.15	4.80	4.55	4.35	4.70	4.80	5.20	5.90	5.60	6.95	7.15
1918.....	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1917.....	10.40	10.90	11.30	9.65	9.65	11.20	15.00	12.70	13.35	7.00	7.00	7.00
1916.....	3.75	3.75	3.60	3.85	3.10	3.00	3.00	3.05	3.25	4.35	8.60	9.25
1915.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.05	2.25	2.30	2.95	3.15
1914.....	2.50	2.40	2.40	2.40	2.40	2.35	2.30	2.25	2.25	2.20	2.10	2.00
1913.....	4.45	3.70	3.50	3.05	2.90	2.85	2.85	2.85	2.85	2.75	2.50	2.50
1912.....	2.05	2.20	2.65	2.75	2.60	2.55	2.45	2.60	2.65	3.35	4.40	4.50
1911.....	1.95	1.95	2.00	2.00	1.90	1.75	1.80	1.85	1.85	1.85	1.90	1.90
1910.....	3.00	2.90	2.80	2.55	2.30	2.15	2.10	2.15	2.10	2.05	2.00	2.00
1909.....	1.70	1.60	1.55	1.50	1.45	1.50	1.50	1.65	2.30	2.75	2.80	2.75
1908.....	1.80	1.75	1.70	1.65	1.65	1.65	1.65	1.65	1.65	1.70	1.75	1.80
1907.....	3.75	3.55	3.00	2.70	2.15	2.05	2.40	2.60	2.80	2.90	2.40	2.00
1906.....	3.00	2.40	2.35	2.60	2.55	2.40	2.55	2.70	2.75	2.85	3.20	3.60
1905.....	2.80	2.50	2.50	2.00	1.90	1.85	1.80	1.85	2.00	2.70	3.00	2.85
1904.....	1.45	1.50	1.55	1.50	1.45	1.40	1.40	1.40	1.40	1.45	1.85	2.15
1903.....	4.50	4.50	4.00	3.75	3.50	3.00	2.50	2.00	2.00	1.90	1.90	1.75
1902.....	2.25	2.25	2.50	2.50	2.50	2.50	2.50	3.25	4.00	5.00	5.00	5.00
1901.....	1.75	1.75	2.00	2.00	2.00	1.85	1.75	1.75	1.75	2.00	2.00	2.00
1900.....	3.00	3.50	4.00	3.75	3.00	2.50	2.00	1.75	1.75	1.75	1.75	1.75

By-Product Foundry Coke

Per Net Ton

Newark, Delivered, 1921-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00
1927.....	9.84	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59
1926.....	11.01	11.01	11.01	9.59	9.59	9.59	9.59	9.59	9.59	9.59	10.59	10.59
1925.....	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.71	11.04	11.52
1924.....	10.91	10.91	10.91	10.81	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41
1923.....	12.84	12.84	12.84	12.84	12.34	11.84	11.34	11.34	11.34	11.41	10.91	10.91
1922.....	8.59	8.59	8.59	8.84	9.49	10.34	11.47	14.04	14.84	14.84	13.28	12.84
1921.....	.....	.....	.....	.....	.....	.....	8.84	8.84	8.84	8.84	8.84	8.84

Market History —

St. Louis, Ovens, 1921-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$9.75	$9.75	$9.75	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00
1927.....	10.50	10.50	10.50	*9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75
1926.....	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.25	10 50
1925.....	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.15	9.50	9.80	10.00	10.00
1924.....	12.50	12.50	12.50	12.00	12.00	10.60	9.20	9.00	9.00	9.00	9.00	9.00
1923.....	14.00	14.25	14.20	14.00	14.00	14.00	14.00	13.00	13.00	13.00	13.00	13.00
1922.....	9.50	9.50	9.30	9.00	9.00	9.00	9.00	11.40	13.00	14.00	14.00	14.00
1921.....	....	....	....	....	....	....	....	....	....	....	....	9.50

*Granite City previous to April 1927.

Boston, Delivered, 1921-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$11.50	$11.50	$11.50	$11.00	$11.00	$11.00	$11.00	$11.00	$11.00	$11.00	$11.00	$11.00
1927.....	13.50	12.65	12.50	12.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
1926.....	13.00	13.00	13.00	12.50	12.50	12.00	12.00	12.00	12.00	12.00	13.00	13.50
1925.....	11.50	12.00	12.00	12.00	12 00	11.50	11.50	11.65	12.00	12.00	12.90	13.00
1924.....	12.50	12.50	12.50	12.00	12.00	11.30	*11.80	11.50	11.50	11.50	11.50	11.50
1923.....	16.00	16.00	16.00	16.00	16.00	15.50	13.50	13.50	13.50	13.50	12.50	12.50
1922.....	10.40	10.25	10.15	10.15	10.15	10.15	14.00	16.30	16.50	16.50	16.20	16.00
1921.....	.....	.....	.....	.....	.....	.....	.....	.....	10.66	10.66	10.66	10.66

*From this point forward—New England delivered.

Chicago, Ovens, 1921-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$9.00	$9.00	$9.00	$9.00	$9.00	$8.50	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00
1927.....	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.30	9.00
1926.....	10.50	10.50	10.50	9.95	9.75	9.75	9.75	9.75	9.75	9.75	9.75	10.25
1925.....	10.75	10.75	10.75	10.75	10.75	10.75	9.75	9.75	9.75	10.25	10.45	10.50
1924.....	12.50	12.50	12.50	12.50	12.50	12.50	11.45	10.75	10.75	10.75	10.75	10.75
1923.....	15.00	15.00	15.00	15.00	15.00	15.00	13.50	13.50	13.50	13.50	12.50	12.50
1922.....	11.25	11.25	11.25	11.25	11.25	11.25	11.25	12.60	13.50	13.50	14.70	15.00
1921.....	.....	.....	.....	.....	.....	.....	11.25	11.25	11.25	11.25	11.25	11.25

Birmingham, Ovens, 1925-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$5.00	$5.00	$5.00	$3.95	$4.80	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00
1927.....	5.15	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.25	5.00
1926.....	5.60	5.50	5.50	5.15	5.15	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1925.....	....	4.90	5.00	5.00	4.65	4.50	4.50	4.50	4.60	4.75	5.70	5.70

Iron and Steel Scrap

Per Gross Ton Delivered

Low Phosphorus Scrap, Pittsburgh, 1917-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$18.85	$18.50	$18.20	$18.35	$18.50	$18.50	$18.50	$19.00	$20.00	$20.75	$21.00	$21.00
1927.....	20.25	19.50	20.00	20.50	19.10	19.10	19.00	19.00	20.00	19.50	18.60	18.50
1926.....	24.00	22.00	21.50	20.90	19.50	19.75	20.30	21.75	21.60	20.25	20.40	20.30
1925.....	26.20	25.35	23.85	21.60	21.75	22.40	22.50	22.50	23.00	23.40	24.00	24.00
1924.....	23.90	24.25	23.75	20.60	19.30	21.40	21.70	22.00	22.25	22.30	23.50	25.00
1923.....	25.15	27.00	31.30	32.10	28.30	25.00	23.15	22.70	23.50	22.50	20.70	22.50
1922.....	17.50	17.10	17.10	18.60	20.00	20.60	21.00	20.60	22.90	24.85	25.00	24.50
1921.....	24.50	22.00	21.20	18.25	18.00	17.00	15.25	15.50	16.30	18.00	17.65	17.25
1920.....	31.50	33.00	32.60	30.60	30.00	30.75	30.00	33.15	34.00	33.75	31.00	25.50
1919.....	29.40	24.25	22.50	22.40	22.00	21.25	23.00	24.00	24.00	24.00	25.75	27.50
1918.....	42.20	40.00	40.00	39.00	39.00	39.00	39.00	39.00	39.00	39.00	38.60	38.50
1917.....	32.00	30.00	33.00	34.25	36.60	43.50	52.75	43.00	47.25	43.50	39.00	39.00

No. 1 Cast, Pittsburgh, 1917-1928

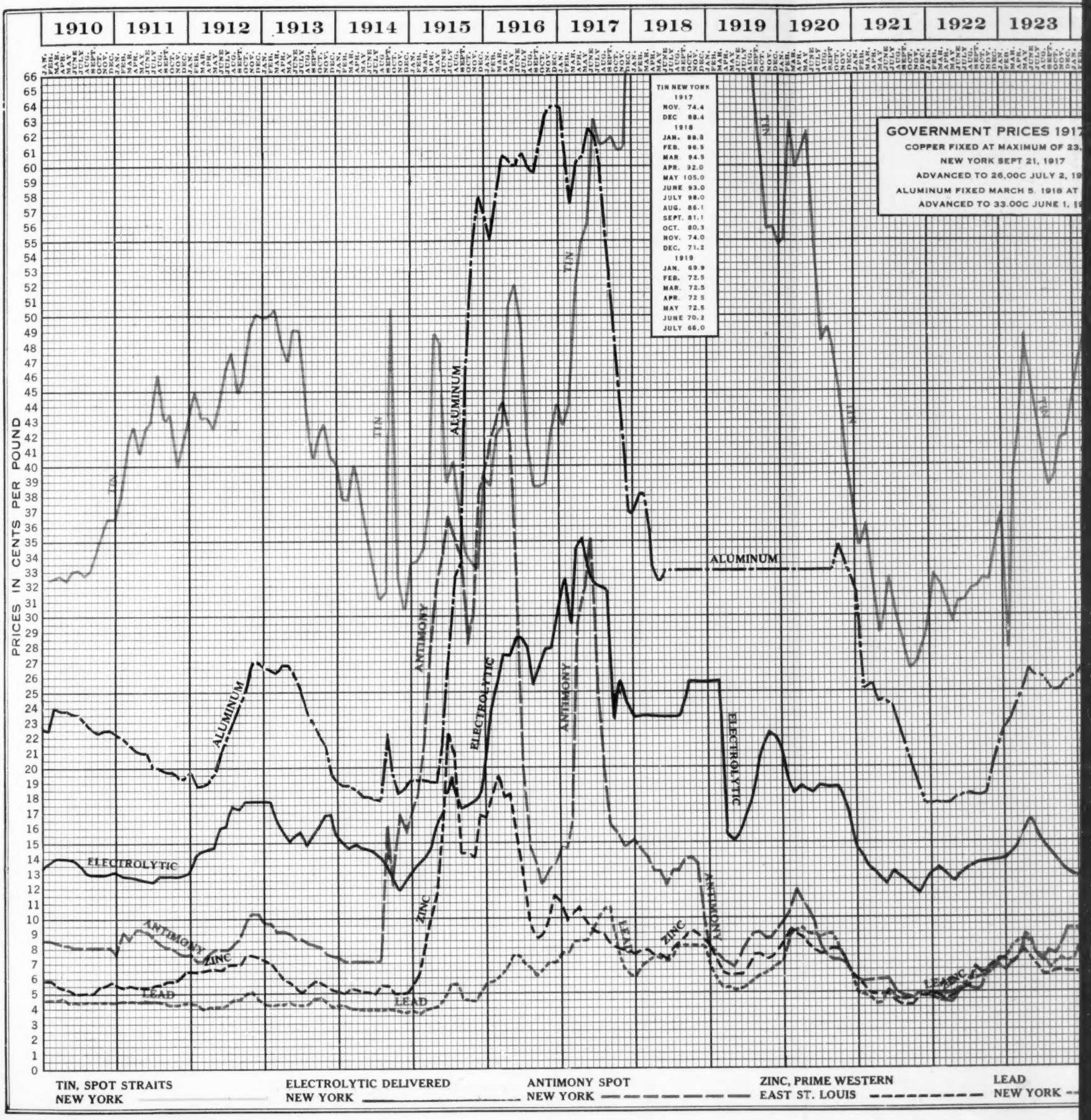
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$14.50	$14.50	$14.50	$14.75	$14.60	$14.00	$14.00	$14.05	$14.25	$14.55	$15.10	$14.75
1927.....	16.00	15.60	15.60	16.00	15.75	15.10	15.00	15.00	15.00	14.70	14.50	14.50
1926.....	17.40	16.86	17.00	17.00	16.25	15.85	15.60	16.85	16.40	16.10	16.00	16.00
1925.....	19.50	18.85	18.35	17.80	17.00	17.00	17.00	17.10	17.50	17.40	17.75	17.50
1924.....	21.30	20.85	19.60	18.35	17.50	17.75	17.70	18.00	18.35	17.70	18.25	18.50
1923.....	22.65	24.50	27.70	27.75	25.60	23.75	21.50	21.20	21.50	19.35	18.50	20.00
1922.....	16.00	16.00	16.40	17.25	18.50	18.70	19.15	19.00	21.75	23.35	23.30	22.50
1921.....	24.50	22.00	21.00	18.25	17.50	16.00	15.00	14.85	16.30	17.50	17.10	16.25
1920.....	32.50	41.50	41.00	39.60	39.00	40.00	38.50	41.50	42.20	40.75	38.00	27.50
1919.....	25.60	21.00	21.00	21.75	21.00	21.00	21.00	24.00	24.50	25.00	28.75	30.50
1918.....	28.00	28.00	28.00	34.00	32.50	32.50	32.50	32.50	32.50	32.50	32.40	32.00
1917.....	20.00	19.75	21.50	23.35	24.60	33.25	34.75	35.00	32.50	28.00	28.50	28.50

No. 1 Cast, Eastern Pennsylvania, 1915-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$16.75	$16.75	$16.75	$16.25	$16.25	$16.00	$16.00	$15.75	$16.20	$17.00	$16.50	$16.50
1927.....	17.75	17.50	17.50	17.25	17.25	16.75	16.35	16.25	16.25	16.25	16.75	16.75
1926.....	18.35	18.25	18.25	18.25	18.00	17.75	17.80	18.25	18.15	17.75	17.75	17.75
1925.....	20.75	19.35	18.50	18.20	17.10	17.75	17.75	17.75	18.65	18.75	18.75	18.75
1924.....	20.75	20.35	19.25	18.35	17.10	17.90	17.80	18.00	18.40	17.95	18.25	19.50
1923.....	23.30	24.75	28.00	26.85	24.80	22.75	21.00	20.00	20.35	19.70	19.50	20.50
1922.....	16.75	16.50	17.00	17.40	17.90	18.50	18.00	18.00	20.65	23.00	21.90	20.50
1921.....	24.15	23.35	20.50	18.15	17.90	17.50	17.50	16.50	16.50	17.50	18.00	17.50
1920.....	36.50	38.55	40.00	38.00	38.00	37.00	37.20	38.75	39.80	38.00	34.75	28.90
1919.....	28.15	25.00	22.50	22.50	21.50	22.00	23.50	24.65	25.00	25.15	28.00	31.75
1918.....	33.50	34.50	33.90	32.75	33.00	33.75	34.00	34.00	34.00	34.00	34.00	34.00
1917.....	20.75	20.15	22.50	26.75	30.00	34.75	38.35	34.10	32.90	30.00	30.50	32.00
1916.....	17.50	17.50	17.75	18.00	17.75	16.50	16.00	16.00	16.25	16.50	18.50	22.00
1915.....	12.00	12.00	12.50	12.50	12.00	12.25	12.25	13.50	14.50	14.50	15.00	15.60

IRON TRADE REVIEW

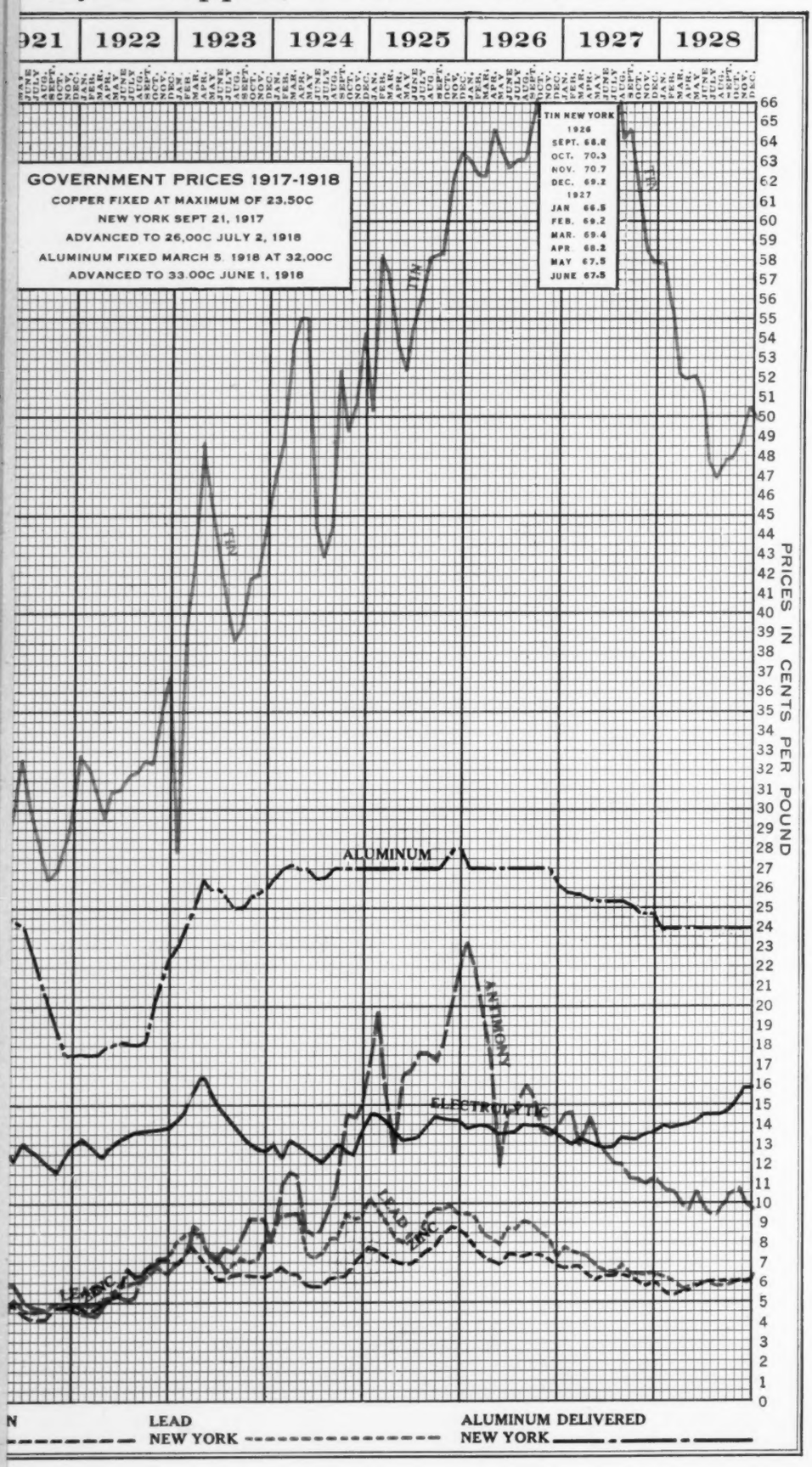
Fluctuations in prices of pig tin, aluminum, antimony, electrolytic copper,



Supplement to IRON TRADE REVIEW, Jan. 3, 1929 issue.

DE

trolytic copper, zinc and lead, 1910-1928



Market History —

No. 1 Cast, Chicago, 1918-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$15.75	$15.75	$15.65	$15.65	$15.90	$15.95	$15.95	$15.95	$16.30	$16.55	$16.90	$17.35
1927.....	18.90	18.90	18.50	18.10	17.35	16.65	16.55	16.80	16.80	16.25	15.85	15.70
1926.....	19.40	18.75	18.75	18.65	18.05	18.15	19.55	19.00	18.95	17.90	18.35	18.50
1925.....	22.10	20.15	19.70	18.85	19.00	19.50	19.75	20.30	20.15	19.40	20.90	20.50
1924.....	22.10	22.25	20.80	20.00	19.00	17.75	18.60	19.00	20.25	19.20	19.25	20.75
1923.....	24.30	25.75	28.50	27.55	24.20	23.25	23.25	21.20	21.50	20.40	20.55	21.50
1922.....	14.00	14.50	15.10	16.15	17.40	17.30	17.65	19.70	23.80	24.00	22.90	22.00
1921.....	20.35	21.15	18.10	15.25	15.85	14.90	13.75	13.95	14.50	15.25	15.50	14.00
1920.....	42.50	43.25	42.20	44.10	42.50	41.75	41.20	42.00	39.30	32.75	27.65	22.10
1919.....	26.25	22.05	23.10	23.50	22.35	23.40	20.65	27.75	26.75	28.15	31.10	35.35
1918.....	30.00	30.00	33.00	32.45	30.75	31.00	31.80	33.40	34.00	34.00	32.75	29.00

Iron Car Wheels, Chicago, 1915-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$13.70	$14.25	$13.95	$13.50	$13.45	$13.10	$13.00	$13.00	$13.00	$13.10	$14.05	$14.25
1927.....	14.95	15.10	15.00	14.85	14.00	13.50	13.80	14.75	14.25	13.50	13.15	13.40
1926.....	18.00	16.30	16.70	16.45	15.65	15.40	16.50	16.50	15.75	14.50	14.50	14.60
1925.....	21.00	19.65	17.50	16.85	15.90	17.40	17.15	17.50	17.60	17.25	18.15	18.40
1924.....	20.60	21.25	19.90	17.50	16.60	15.65	16.40	16.90	18.40	17.90	18.60	19.50
1923.....	25.35	26.50	28.50	27.65	24.30	21.50	20.90	19.60	19.60	18.60	17.85	19.00
1922.....	15.25	14.65	15.90	18.15	18.80	18.25	18.90	20.40	23.50	24.75	24.60	23.75
1921.....	21.50	21.40	16.60	14.45	14.50	13.70	12.75	13.70	14.90	16.15	16.25	15.90
1920.....	36.25	38.75	36.15	38.50	38.25	36.00	35.70	38.40	38.80	37.25	33.25	25.80
1919.....	23.20	21.15	20.00	20.40	20.20	22.00	24.40	25.15	23.50	23.60	28.50	29.75
1918.....	30.40	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	27.50
1917.....	19.75	18.30	20.30	23.25	27.20	37.00	36.75	30.70	31.00	25.90	27.50	29.50
1916.....	14.75	14.05	14.05	14.00	13.15	12.50	11.90	12.00	12.25	12.25	15.95	21.00
1915.....	10.00	10.00	10.00	10.00	9.75	9.85	10.30	11.40	11.75	11.75	12.75	14.75

Heavy Melting Steel, Pittsburgh, 1902-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$15.35	$15.05	$14.75	$14.85	$15.00	$14.70	$14.10	$15.00	$16.55	$17.35	$17.35	$17.50
1927.....	17.00	16.10	16.40	16.50	15.50	15.10	14.95	15.00	15.00	14.50	14.50	14.60
1926.....	18.75	17.60	17.70	16.90	16.00	15.85	16.70	17.75	17.75	17.00	17.00	16.75
1925.....	22.10	19.00	18.25	17.00	16.60	17.10	17.20	19.25	19.00	18.40	19.50	19.00
1924.....	21.10	21.60	19.75	16.60	15.40	16.25	17.30	17.75	18.60	18.20	19.85	21.00
1923.....	21.65	23.40	26.10	25.85	22.50	20.50	18.25	17.50	18.00	16.10	15.70	18.50
1922.....	14.50	14.70	14.95	16.50	17.00	16.85	16.50	17.10	19.50	21.35	20.30	20.00
1921.....	15.00	15.00	15.00	13.00	13.60	13.10	12.00	12.60	11.30	14.00	14.25	14.25
1920.....	26.50	28.15	28.00	26.40	25.50	25.30	25.70	27.75	28.60	28.00	24.00	18.75
1919.....	20.80	17.00	14.60	15.75	15.55	17.25	19.90	21.25	20.50	20.00	21.90	24.65
1918.....	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1917.....	23.25	21.90	23.40	28.15	28.40	40.00	40.25	36.60	35.50	31.30	29.60	30.00
1916.....	17.50	17.35	17.95	18.10	17.10	16.25	16.25	16.00	16.10	17.80	20.55	26.75
1915.....	11.55	11.60	12.00	11.90	11.75	11.75	11.75	13.38	14.25	14.00	15.30	17.40
1914.....	11.30	12.15	12.40	12.25	12.00	12.00	12.00	11.65	11.65	11.40	10.40	10.45
1913.....	15.15	14.90	14.40	14.40	14.15	13.50	12.75	12.65	12.65	12.65	11.75	11.20
1912.....	12.50	12.65	12.40	13.00	13.40	13.40	13.65	13.55	13.90	14.40	15.30	15.00
1911.....	13.50	14.30	14.40	13.50	12.75	13.15	12.90	13.40	13.15	12.25	12.15	12.50
1910.....	17.90	17.65	17.00	17.00	16.00	15.25	14.50	14.25	14.25	14.40	14.15	13.75
1909.....	16.50	16.00	14.75	14.15	14.95	15.50	15.75	16.00	16.75	17.90	18.15	17.95
1908.....	13.25	13.25	13.50	12.75	12.75	13.00	13.25	14.75	14.75	14.50	14.75	16.25
1907.....	19.25	18.75	18.25	18.25	18.15	18.65	18.50	18.25	17.75	17.50	15.45	13.75
1906.....	17.75	16.65	15.90	14.65	15.25	15.00	15.75	16.00	16.90	16.75	17.25	19.75
1905.....	16.75	16.15	16.50	16.50	15.40	14.50	14.25	14.15	15.40	16.20	17.15	18.25
1904.....	12.65	13.25	13.75	14.15	13.05	11.50	10.75	11.15	11.75	12.00	13.65	14.90
1903.....	22.25	21.75	21.25	22.15	21.65	20.50	20.25	18.75	18.25	16.00	14.50	11.50
1902.....	17.25	17.45	18.55	19.40	20.25	21.40	22.25	21.25	21.25	21.65	21.15	22.25

Heavy Melting Steel, Chicago, 1909-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$12.25	$12.55	$12.75	$12.75	$12.95	$12.60	$12.30	$12.65	$12.90	$13.75	$14.50	$14.50
1927.....	13.20	13.10	13.05	13.10	12.35	12.00	12.10	12.35	12.20	11.75	11.50	11.95
1926.....	14.95	13.75	14.00	13.20	12.25	12.65	14.20	14.00	14.10	13.05	13.00	12.90
1925.....	19.45	17.55	16.70	15.00	14.90	15.90	15.35	16.05	16.45	16.25	16.40	15.80
1924.....	17.40	18.00	16.70	14.65	13.75	13.55	14.75	15.40	16.40	16.25	17.05	18.50
1923.....	18.70	19.75	23.15	22.40	19.75	17.75	17.10	16.25	16.55	14.50	13.80	16.00
1922.....	11.20	11.15	12.05	13.55	14.65	14.45	15.15	15.85	18.15	18.50	17.40	16.75
1921.....	15.25	15.25	12.55	11.25	11.50	11.20	10.55	10.70	11.30	12.55	12.40	11.00
1920.....	24.25	25.05	24.20	23.95	23.15	22.40	23.70	24.15	24.20	21.40	18.50	16.75
1919.....	19.20	14.90	15.25	16.40	15.40	16.75	19.40	20.75	19.00	18.80	20.65	21.25
1918.....	29.70	30.00	30.00	28.65	28.90	29.00	29.00	29.00	29.00	29.00	29.00	26.50
1917.....	20.25	21.65	23.00	26.65	28.70	37.00	35.50	33.10	32.65	27.00	28.50	28.90
1916.....	15.50	15.25	16.20	16.75	16.50	15.35	14.15	14.90	15.50	16.50	19.35	23.35
1915.....	8.90	9.45	9.75	9.30	9.25	9.40	10.15	11.50	12.00	11.55	13.15	15.40
1914.....	9.20	10.00	9.80	9.50	9.95	9.75	9.50	9.50	9.40	9.00	8.25	8.25
1913.....	12.75	12.50	12.50	12 50	12.00	12.00	12.00	12.00	12.00	12.00	9.00	9.00
1912.....	11.00	10.75	11.25	12.25	12.25	12.25	11.75	12.50	13.00	14.00	13.75	13.75
1911.....	11.50	12.00	12.00	11.50	10.25	10.25	10.25	10.75	10.50	10.00	9.75	9.75
1910.....	16.00	15.50	14.50	14.50	13.00	13.00	12.50	12.25	12.25	12.25	12.00	12.00
1909.....	14.00	13.40	12.15	12.90	13.50	14.15	14.05	14.95	15.80	16.30	15.75	15.50

Heavy Melting Steel, Eastern Pennsylvania, 1909-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$14.00	$14.00	$13.75	$13.75	$13.75	$13.15	$12.75	$12.75	$14.65	$16.00	$15.90	$15.50
1927.....	15.60	15.00	14.75	14.75	14.45	14.25	13.75	13.75	14.00	14.00	14.00	14.00
1926.....	17.35	16.35	16.20	15.90	15.25	15.25	15.50	16.75	16.85	16.65	15.95	15.50
1925.....	20.00	17.85	16.25	15.50	15.00	15.65	16.00	16.75	17.25	17.00	17.60	17.70
1924.....	18.05	18.95	17.00	15.25	14.20	15.00	15.00	16.50	15.90	16.50	18.05	19.00
1923.....	19.70	21.20	24.85	23.50	20.40	18.65	17.25	16.00	16.85	15.50	15.50	17.00
1922.....	11.75	12.25	13.15	14.35	15.15	15.30	15.00	15.25	17.10	18.00	16.70	16.00
1921.....	15.00	14.50	13.40	11.75	11.80	11.85	11.25	11.75	11.75	12.25	12.60	12.00
1920.....	24.25	25.75	25.55	24.30	23.60	22.40	22.00	24.10	26.40	23.80	20.30	16.90
1919.....	19.00	15.25	14.25	15.85	15.30	16.15	18.85	19.60	19.00	19.55	20.80	23.90
1918.....	29.80	30.00	29.50	28.30	28.50	28.50	28.50	28.50	28.50	28.50	28.00	25.00
1917.....	21.75	20.25	23.50	25.00	26.00	32.60	37.00	32.80	30.75	26.00	26.80	28.00
1916.....	15.50	14.95	16.15	16.80	16.35	15.35	13.95	15.40	16.65	17.50	21.25	26.00
1915.....	10.00	10.50	11.00	11.25	11.50	11.50	12.00	13.50	14.50	15.00	14.50	16.00
1914.....	10.50	11.25	11.50	11.00	10.75	10.75	10.50	10.75	10.75	9.75	9.50	9.50
1913.....	14.50	13.50	13.50	13.75	12.50	12.00	11.50	11.75	12.00	11.00	10.25	10.00
1912.....	12.25	12.00	12.25	13.00	13.75	13.50	13.75	14.25	14.75	15.50	15.25	15.00
1911.....	12.75	14.25	14.25	13.75	13.25	13.00	13.00	13.25	12.75	12.00	12.25	12.50
1910.....	17.00	16.50	16.50	15.50	14.50	14.50	14.00	13.75	14.00	13.50	12.75	12.50
1909.....	17.00	15.50	13.75	13.50	14.50	15.50	16.00	17.00	17.50	18.00	18.00	17.25

Market History —

Cast Borings, Pittsburgh, 1902-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$11.50	$11.00	$10.70	$10.60	$10.70	$10.40	$9.80	$10.50	$12.00	$12.40	$12.00	$12.00
1927.....	12.50	12.00	12.10	12.38	11.13	10.50	10.50	11.50	11.30	11.00	11.00	11.00
1926.....	14.75	14.25	13.25	12.60	11.75	11.85	12.20	12.75	13.00	12.60	12.50	12.50
1925.....	17.20	15.60	14.50	13.60	12.85	13.40	13.50	14.50	14.85	14.10	15.10	14.80
1924.....	16.50	16.60	15.35	13.65	12.00	13.85	13.75	14.20	14.75	15.20	16.25	17.00
1923.....	18.50	19.75	21.80	21.10	21.60	17.50	15.50	15.00	16.00	13.40	12.40	14.00
1922.....	10.40	11.25	11.85	13.00	14.15	14.80	15.75	15.75	17.30	18.15	17.75	17.50
1921.....	12.50	12.35	11.60	9.70	9.50	9.00	7.60	8.00	9.05	11.60	10.65	9.55
1920.....	19.35	21.70	20.35	19.85	19.25	18.35	18.25	19.55	20.50	19.35	17.00	14.50
1919.....	14.00	11.80	10.95	12.60	11.30	11.65	13.90	16.10	15.75	15.75	17.95	18.35
1918.....	20.00	20.00	20.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	18.00
1917.....	12.35	12.25	13.20	14.70	15.45	21.10	23.90	22.00	23.55	20.70	20.00	20.00
1916.....	11.35	11.40	11.40	11.30	10.30	9.90	8.65	8.00	8.50	9.15	9.85	13.35
1915.....	8.25	8.15	8.40	8.40	8.40	8.65	8.65	9.00	9.25	9.75	10.00	10.20
1914.....	7.90	8.40	9.25	8.40	8.40	7.90	8.15	8.50	8.50	8.25	8.25	8.25
1913.....	10.40	10.40	10.40	10.40	10.40	9.25	8.40	8.15	8.15	8.40	7.75	7.45
1912.....	9.65	9.40	9.15	9.65	10.15	10.15	10.25	10.15	9.90	9.90	10.50	10.40
1911.....	8.65	8.65	9.50	8.75	8.50	8.90	8.90	9.25	9.40	8.50	8.25	8.35
1910.....	11.00	10.75	9.75	9.75	9.25	8.75	8.00	8.25	8.40	8.40	8.50	8.65
1909.....	10.75	9.75	8.25	7.75	7.25	9.65	9.75	9.50	10.65	11.15	11.25	11.00
1908.....	6.50	7.50	8.00	8.00	7.50	7.75	7.75	8.75	8.75	8.75	9.75	11.00
1907.....	12.40	12.65	13.15	13.65	13.50	13.75	13.75	13.25	13.25	13.00	9.95	6.50
1906.....	10.90	10.15	9.65	8.15	8.90	8.75	8.75	9.00	9.75	10.25	10.75	12.25
1905.....	10.75	11.25	11.15	10.90	10.15	10.00	9.15	8.40	8.90	9.75	10.50	10.90
1904.....	6.00	5.75	5.40	6.15	7.15	5.65	5.75	5.25	6.25	6.25	7.40	8.75
1903.....	11.25	11.50	11.65	11.25	11.25	.....	.....	9.00	9.00	7.00	.....	5.25
1902.....	8.55	9.15	9.65	10.75	11.75	12.00	11.65	10.75	14.40	15.85	11.65	11.50

No. 1 Railroad Wrought, Chicago, 1915-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$12.65	$12.40	$12.45	$12.45	$13.05	$12.70	$12.30	$12.40	$12.90	$13.50	$14.25	$14.50
1927.....	14.20	13.95	13.50	13.50	12.75	12.10	12.35	13.45	12.70	11.40	11.25	11.25
1926.....	15.00	14.40	14.50	14.05	12.55	12.65	14.80	14.75	14.56	14.50	13.75	13.75
1925.....	19.15	17.75	16.65	14.60	14.65	15.90	15.90	17.45	17.05	16.30	17.70	15.90
1924.....	17.50	17.50	16.05	14.80	13.60	13.25	14.80	15.75	16.70	15.95	17.10	18.75
1923.....	19.40	20.50	23.25	22.75	19.95	16.95	16.60	17.05	18.25	15.30	14.10	16.00
1922.....	11.80	11.65	12.25	13.25	14.35	14.20	15.20	16.35	19.95	20.40	18.10	17.00
1921.....	15.65	15.90	13.50	12.05	11.90	10.80	10.25	11.75	13.05	14.65	13.70	12.10
1920.....	29.00	30.75	30.70	30.70	29.50	28.00	28.10	28.50	27.50	22.50	19.55	16.60
1919.....	23.30	16.65	17.65	18.50	17.05	18.70	21.20	23.25	21.25	22.00	26.50	27.00
1918.....	35.00	35.00	35.00*	35.00	35.00	35.00	35.50	33.50	33.50	33.50	33.50	29.00
1917.....	23.75	24.00	25.75	29.80	32.60	41.75	39.15	35.40	36.25	31.90	30.60	31.50
1916.....	15.50	14.95	16.15	16.80	16.35	15.35	13.95	15.40	16.65	17.50	21.25	26.00
1915.....	8.80	8.90	9.00	8.55	8.75	8.75	8.90	10.10	10.75	10.70	12.75	14.90

*Quotations net tons to March 31, 1918, gross tons thereafter.

No. 1 Railroad Wrought, Eastern Pennsylvania, 1904-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$14.80	$15.10	$15.50	$15.50	$15.50
1927.....	17.00	17.00	17.65	16.75	16.75	16.75	16.25	15.95	15.75	15.75	15.75	15.75
1926.....	18.35	18.00	18.00	17.75	17.35	17.00	17.00	17.25	17.00	17.00	17.00	17.00
1925.....	21.50	20.50	19.50	18.40	17.60	18.20	18.25	18.25	18.25	18.25	18.75	18.75
1924.....	20.10	21.35	19.00	18.40	17.75	17.75	18.05	18.50	18.75	18.75	18.95	19.00
1923.....	22.25	24.10	27.60	27.00	24.40	22.75	18.85	17.50	19.00	18.00	17.75	19.00
1922.....	15.00	15.00	15.20	15.63	16.80	17.25	18.00	18.00	20.75	22.00	21.00	18.95
1921.....	20.00	20.00	18.20	15.50	15.00	15.00	14.25	14.00	14.20	15.40	16.00	15.75
1920.....	32.90	36.10	36.50	35.25	34.00	33.50	33.50	33.25	34.40	29.85	25.75	20.10
1919.....	29.80	25.00	24.00	21.50	21.90	22.50	24.70	27.25	27.00	27.00	27.85	30.75
1918.....	35.00	35.00	35.00*	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
1917.....	27.00	26.75	30.00	36.00	40.80	47.85	54.05	46.20	44.50	41.80	35.35	35.00
1916.....	22.25	22.50	23.00	23.00	22.50	20.00	19.75	20.00	21.00	22.00	20.55	26.75
1915.....	11.75	12.00	12.50	12.50	12.50	12.75	13.50	15.00	16.00	16.00	17.00	20.00
1914.....	12.90	14.75	15.25	13.15	13.15	12.65	12.65	12.00	12.50	11.50	11.50	11.50
1913.....	16.25	16.25	15.25	16.25	15.50	14.75	14.70	14.25	14.25	14.25	13.75	13.35
1912.....	15.75	14.75	14.50	14.25	16.25	16.00	15.75	15.25	16.65	16.75	17.75	16.75
1911.....	16.25	16.25	17.75	16.75	15.50	15.25	15.25	15.75	15.75	14.50	14.00	14.45
1910.....	18.75	19.00	18.75	19.25	18.25	16.75	16.25	16.25	16.15	16.75	16.25	16.25
1909.....	20.25	19.25	16.25	15.25	16.25	18.60	17.75	18.75	19.75	20.75	21.25	20.25
1908.....	14.25	14.25	15.25	14.75	15.50	15.75	16.00	16.50	18.25	18.25	18.50	19.75
1907.....	23.25	22.25	21.00	20.50	20.00	20.75	20.25	19.75	18.00	18.00	17.25	14.75
1906.....	22.75	21.00	19.75	20.25	20.75	18.25	17.50	18.25	20.75	22.25	22.25	23.25
1905.....	19.75	21.75	22.00	22.75	21.75	18.75	17.00	17.50	19.50	21.75	19.85	23.25
1904.....	14.65	16.00	16.50	18.25	17.75	14.00	12.75	13.25	14.40	15.25	16.25	19.00

*Quotations net tons to March 31, 1918, gross tons thereafter.

Machine Shop Turnings, Pittsburgh, 1906-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$10.60	$10.15	$10.15	$10.25	$9.90	$9.20	$8.80	$9.65	$11.00	$11.25	$10.85	$12.00
1927.....	12.00	11.00	11.60	12.40	11.15	10.50	10.85	12.50	11.75	11.50	11.15	11.45
1926.....	14.50	13.60	13.00	12.60	11.65	11.00	11.60	12.85	13.05	12.00	11.85	11.50
1925.....	17.80	16.00	14.75	13.60	12.75	13.25	13.50	14.50	14.85	14.15	14.85	14.50
1924.....	15.50	16.10	15.00	13.25	11.10	13.00	13.50	14.00	14.75	14.40	16.00	17.50
1923.....	16.75	18.25	20.65	20.10	18.91	16.60	13.50	11.40	12.75	11.40	11.00	13.50
1922.....	9.50	9.55	10.65	12.30	13.45	13.65	13.75	13.95	15.45	15.40	16.25	15.90
1921.....	10.50	10.50	9.70	8.55	8.50	7.90	7.25	7.65	8.55	10.25	10.25	9.20
1920.....	16.75	19.25	18.40	16.85	15.15	17.65	13.55	15.75	15.80	16.00	14.75	11.60
1919.....	11.50	9.70	9.75	11.15	10.00	10.65	12.70	14.00	13.25	12.75	14.00	15.50
1918.....	20.00	20.00	20.00	19.00	18.70	18.50	18.50	18.50	18.50	18.50	18.50	17.75
1917.....	12.10	12.00	12.45	13.90	14.55	20.80	23.70	21.20	23.25	19.50	19.65	20.00
1916.....	10.35	9.55	10.75	11.20	10.35	10.05	8.55	7.75	7.25	8.00	9.10	12.75
1915.....	7.75	7.90	7.90	7.90	7.90	8.15	8.00	7.65	8.65	8.65	9.15	8.75
1914.....	6.90	7.65	8.70	8.15	8.00	7.90	7.90	7.90	7.90	8.00	7.95	7.75
1913.....	10.65	10.25	9.50	9.00	8.65	7.25	6.75	6.75	6.75	7.15	7.15	6.40
1912.....	10.25	9.75	9.50	10.00	10.25	10.90	11.00	11.00	10.65	10.90	11.50	11.25
1911.....	9.00	9.40	10.50	9.50	9.15	9.15	9.15	9.75	9.65	9.15	9.90	9.35
1910.....	13.25	13.00	12.00	11.75	11.25	10.25	9.25	9.25	9.00	9.00	9.15	9.25
1909.....	13.00	11.75	10.25	8.75	8.25	11.25	11.75	11.50	12.50	13.25	13.75	13.25
1908.....	7.75	8.75	8.75	8.50	8.25	8.25	8.25	9.00	9.50	9.50	10.50	11.75
1907.....	15.25	15.00	15.75	16.00	15.75	15.50	15.50	15.25	14.50	14.00	11.60	7.75
1906.....	.....	.....	12.50	11.75	11.25	11.25	11.25	11.50	12.40	12.25	12.40	14.75

Market History —

Rails for Rolling, Chicago, 1908-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$15.00	$15.00	$14.45	$14.00	$14.35	$14.85	$14.50	$15.00	$15.80	$16.40	$16.50	$16.50
1927.....	16.00	16.00	15.50	15.85	15.10	14.60	14.60	15.00	15.20	14.70	13.95	14.00
1926.....	17.55	16.30	16.50	16.00	14.95	15.10	17.10	17.25	17.25	16.65	16.50	16.50
1925.....	20.95	19.15	18.15	15.85	16.75	18.15	17.45	19.10	19.00	18.55	19.40	18.80
1924.....	18.90	20.00	19.30	17.10	15.30	14.55	15.50	16.00	17.40	17.20	18.20	19.50
1923.....	20.55	22.00	24.90	23.65	21.80	19.40	18.40	17.75	18.30	16.25	15.10	17.00
1922.....	12.50	11.50	12.85	14.25	15.50	15.40	16.00	16.75	19.40	20.50	18.90	18.00
1921.....	15.80	15.90	13.30	12.70	13.25	12.80	12.45	12.70	13.05	14.00	13.90	12.50
1920.....	33.60	34.65	32.60	32.50	31.50	32.35	34.90	38.00	38.50	34.00	24.15	17.40
1919.....	22.30	15.55	16.30	17.95	17.45	19.25	24.70	29.00	25.38	26.80	31.15	31.50
1918.....	35.30	35.00	35.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
1917.....	27.25	25.65	27.25	31.90	36.80	46.00	46.25	41.90	41.25	36.00	35.70	35.65
1916.....	17.70	17.10	17.20	17.90	17.25	16.25	15.70	15.70	16.90	18.75	24.90	29.50
1915.....	9.50	9.60	10.00	9.85	10.00	10.00	10.10	11.75	13.15	13.25	14.30	16.70
1914.....	11.00	11.20	11.25	11.25	11.25	11.25	11.25	11.25	10.85	10.00	9.50	9.50
1913.....	16.25	15.50	15.00	14.50	14.00	14.00	12.00	12.50	12.00	12.00	12.00	11.50
1912.....	13.00	13.00	12.75	12.75	13.25	13.50	13.25	13.50	14.75	16.00	16.50	16.50
1911.....	13.50	13.50	13.50	13.00	12.75	12.25	12.25	12.50	12.25	12.25	12.00	12.25
1910.....	17.75	17.75	17.50	17.50	17.25	16.50	16.50	15.50	15.75	15.75	15.00	14.00
1909.....	15.80	15.05	12.80	13.20	14.65	15.50	15.55	16.00	17.20	18.00	20.25	17.70
1908.....	12.30	13.00	12.20	12.75	13.20	14.00	14.45	15.60	16.00	15.70	16.95	17.25

Finished Rolled Material

Per Pound f.o.b.

Tank Plates, Pittsburgh, 1895-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	1.80c	1.85c	1.90c	1.85c	1.85c	1.85c	1.85c	1.85c	1.90c	1.95c	1.95c	1.90c
1927.....	1.90	1.85	1.90	1.85	1.85	1.80	1.80	1.80	1.80	1.75	1.75	1.80
1926.....	1.90	1.85	1.85	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1925.....	2.00	2.10	2.10	2.00	2.00	2.00	2.00	1.90	1.80	1.80	1.85	1.90
1924.....	2.50	2.45	2.40	2.35	2.25	2.15	2.10	2.00	1.95	1.80	1.85	1.90
1923.....	2.05	2.15	2.35	2.45	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1922.....	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	2.00	2.00
1921.....	2.65	2.35	2.05	2.15	2.20	2.00	1.85	1.75	1.70	1.60	1.60	1.50
1920.....	3.10	3.70	3.75	3.65	3.50	3.50	3.50	3.50	3.50	3.20	3.00	2.65
1919.....	3.00	3.00	2.90	2.65	2.65	2.65	2.65	2.65	2.55	2.65	2.65	2.70
1918.....	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917.....	4.25	4.30	5.00	5.45	6.40	7.75	9.45	9.20	7.50	3.25	3.25	3.25
1916.....	2.50	2.55	3.15	3.50	3.50	3.50	3.50	3.75	3.70	3.70	3.90	4.25
1915.....	1.10	1.10	1.15	1.15	1.15	1.20	1.25	1.30	1.35	1.45	1.70	1.95
1914.....	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.20	1.20	1.10	1.10
1913.....	1.50	1.50	1.50	1.50	1.50	1.45	1.45	1.45	1.40	1.35	1.30	1.20
1912.....	1.15	1.10	1.10	1.20	1.25	1.25	1.30	1.35	1.40	1.45	1.50	1.55
1911.....	1.40	1.40	1.40	1.40	1.40	1.35	1.35	1.30	1.25	1.20	1.10	1.15
1910.....	1.55	1.55	1.50	1.50	1.50	1.45	1.40	1.40	1.40	1.40	1.40	1.40
1909.....	1.60	1.45	1.30	1.20	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908.....	1.70	1.70	1.70	1.70	1.70	1.65	1.60	1.60	1.60	1.60	1.60	1.60
1907.....	1.70	1.70	1.70	1.70	1.80	1.80	1.80	1.70	1.70	1.70	1.70	1.70
1906.....	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.70
1905.....	1.45	1.50	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.60	1.60	1.60
1904.....	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.40	1.40	1.40	1.50
1903.....	1.60	1.60	1.75	1.75	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1902.....	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1901.....	1.40	1.40	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1900.....	2.40	2.20	2.00	1.80	1.60	1.35	1.05	1.10	1.05	1.05	1.35	1.40
1899.....	1.30	1.45	1.75	2.05	2.10	2.30	2.45	2.55	2.85	2.80	2.50	2.30
1898.....	1.00	1.00	0.95	1.00	1.10	1.10	1.10	1.10	1.15	1.15	1.10	1.15
1897.....	1.10	1.10	1.10	1.05	1.05	1.00	1.00	1.00	1.00	1.05	1.00	1.00
1896.....	1.40	1.35	1.30	1.35	1.30	1.25	1.25	1.20	1.15	1.15	1.10	1.10
1895.....	1.15	1.10	1.10	1.15	1.20	1.25	1.60	1.70	1.80	1.70	1.60	1.50

Steel Bars, Pittsburgh, 1901-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	1.80c	1.85c	1.90c	1.85c	1.85c	1.85c	1.85c	1.85c	1.90c	1.95c	1.95c	1.90c
1927.....	1.95	1.90	1.90	1.90	1.85	1.85	1.80	1.80	1.80	1.75	1.75	1.80
1926.....	2.00	2.00	2.00	2.00	1.95	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925.....	2.10	2.10	2.10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1924.....	2.40	2.40	2.40	2.30	2.25	2.20	2.15	2.10	2.05	2.00	2.05	2.10
1923.....	2.00	2.15	2.30	2.35	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
1922.....	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	2.00	2.00
1921.....	2.35	2.15	2.00	2.05	2.10	2.05	1.85	1.75	1.65	1.60	1.55	1.50
1920.....	3.10	3.85	3.85	3.65	3.25	3.25	3.25	3.25	3.25	3.25	3.00	2.35
1919.....	2.70	2.70	2.60	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.45	2.90
1918.....	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
1917.....	3.20	3.20	3.45	3.65	3.65	4.00	4.70	4.75	4.25	2.90	2.90	2.90
1916.....	2.40	2.40	2.65	3.00	3.00	2.85	2.75	2.55	2.60	2.70	2.95	3.15
1915.....	1.10	1.10	1.15	1.20	1.20	1.20	1.30	1.35	1.30	1.45	1.70	1.90
1914.....	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.20	1.15	1.10	1.10
1913.....	1.45	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.35	1.25
1912.....	1.15	1.15	1.10	1.15	1.20	1.20	1.25	1.30	1.35	1.40	1.40	1.40
1911.....	1.40	1.40	1.40	1.40	1.40	1.25	1.25	1.20	1.15	1.10	1.10	1.10
1910.....	1.50	1.45	1.45	1.45	1.45	1.45	1.45	1.40	1.40	1.40	1.40	1.40
1909.....	1.40	1.30	1.20	1.15	1.20	1.20	1.25	1.35	1.40	1.40	1.45	1.50
1908.....	1.60	1.60	1.60	1.60	1.60	1.50	1.40	1.40	1.40	1.40	1.40	1.40
1907.....	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1906.....	2.00	1.75	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.60
1905.....	1.45	1.45	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.70	1.80	1.95
1904.....	1.30	1.30	1.35	1.35	1.30	1.30	1.30	1.30	1.35	1.30	1.30	1.40
1903.....	1.65	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.35	1.30
1902.....	1.60	1.50	1.50	1.65	1.80	1.80	1.70	1.75	1.75	1.70	1.60	1.70
1901.....	1.20	1.25	1.45	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.60

Market History —

Rail Steel Bars, Chicago, 1918-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	1.80c	1.80c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c	1.90c	1.95c	2.00c
1927.....	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.80	1.80	1.80
1926.....	2.00	2.00	2.00	2.00	2.00	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925.....	2.03	2.13	2.07	2.00	2.10	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1924.....	2.30	2.30	2.30	2.30	2.20	2.15	2.10	2.05	2.05	2.00	2.00	2.00
1923.....	2.00	2.00	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1922.....	1.60	1.50	1.50	1.55	1.65	1.65	1.70	1.80	1.95	2.00	2.00	2.00
1921.....	2.50	2.50	2.50	2.15	2.00	2.00	1.95	1.85	1.85	1.75	1.70	1.65
1920.....	2.90	3.20	3.35	3.70	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
1919.....	2.80	2.80	2.80	2.55	2.45	2.45	2.45	2.55	2.55	2.55	2.75	2.85
1918.....	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Structural Shapes, Pittsburgh, 1895-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	1.80c	1.85c	1.90c	1.85c	1.85c	1.85c	1.85c	1.85c	1.90c	1.95c	1.95c	1.90c
1927.....	1.95	1.90	1.90	1.90	1.85	1.80	1.80	1.80	1.80	1.75	1.75	1.80
1926.....	1.90	1.90	1.90	1.90	1.90	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925.....	2.10	2.10	2.10	2.00	2.00	2.00	2.00	2.00	1.90	1.90	2.00	1.95
1924.....	2.50	2.50	2.50	2.35	2.25	2.20	2.15	2.05	2.00	2.00	2.00	2.00
1923.....	2.05	2.15	2.35	2.45	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1922.....	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	2.00	1.95
1921.....	2.45	2.25	2.10	2.15	2.20	2.05	1.90	1.75	1.70	1.60	1.60	1.50
1920.....	2.65	3.15	3.25	3.25	3.25	3.25	3.25	3.15	3.10	3.10	3.00	2.45
1919.....	2.80	2.80	2.70	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.50
1918.....	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
1917.....	3.10	3.25	3.45	3.70	4.00	4.00	4.50	4.50	3.75	3.00	3.00	3.00
1916.....	1.85	2.05	2.40	2.50	2.50	2.50	2.50	2.50	2.60	2.70	2.90	3.00
1915.....	1.10	1.10	1.15	1.15	1.20	1.20	1.25	1.30	1.35	1.40	1.65	1.75
1914.....	1.20	1.20	1.20	1.20	1.15	1.10	1.10	1.15	1.20	1.15	1.10	1.05
1913.....	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.40	1.35	1.30	1.25
1912.....	1.15	1.15	1.15	1.20	1.25	1.25	1.30	1.35	1.40	1.45	1.50	1.55
1911.....	1.40	1.40	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.30	1.20	1.15
1910.....	1.55	1.55	1.50	1.50	1.50	1.45	1.40	1.40	1.40	1.40	1.40	1.40
1909.....	1.60	1.45	1.30	1.20	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908.....	1.70	1.70	1.70	1.70	1.70	1.65	1.65	1.60	1.60	1.60	1.60	1.60
1907.....	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1906.....	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1905.....	1.50	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.70	1.70
1904.....	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.40	1.40	1.40	1.40
1903.....	1.75	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1902.....	1.60	1.60	1.70	1.85	2.00	2.25	2.25	2.35	2.25	2.15	2.10	2.00
1901.....	1.50	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1900.....	2.25	2.25	2.25	2.25	2.25	2.05	1.90	1.75	1.70	1.70	1.70	1.70
1899.....	1.30	1.30	1.40	1.50	1.50	1.75	1.95	2.05	2.25	2.25	2.25	2.25
1898.....	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.20	1.20	1.20	1.20	1.20
1897.....	1.55	1.55	1.55	1.55	1.30	1.05	1.00	1.00	1.00	1.10	1.10	1.10
1896.....	1.45	1.50	1.45	1.45	1.50	1.55	1.55	1.55	1.55	1.55	1.50	1.45
1895.....	1.25	1.20	1.20	1.20	1.20	1.35	1.50	1.60	1.65	1.60	1.60	1.55

Bar Iron, Chicago, 1907-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	1.90c	1.95c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c
1927.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.90	1.85	1.90
1926.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1925.....	2.00	2.00	2.10	2.10	2.10	2.05	1.95	1.90	1.90	1.90	2.00	2.00
1924.....	2.40	2.40	2.40	2.35	2.30	2.25	2.20	2.15	2.15	2.10	2.10	2.00
1923.....	2.35	2.45	2.55	2.60	2.60	2.60	2.55	2.50	2.40	2.40	2.40	2.40
1922.....	1.60	1.60	1.60	1.65	1.65	1.75	1.80	2.00	2.25	2.50	2.50	2.35
1921.....	2.75	2.65	2.65	2.50	2.45	2.25	1.95	1.75	1.75	1.75	1.70	1.65
1920.....	3.15	3.45	3.50	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.50
1919.....	3.15	2.95	2.85	2.55	2.50	2.55	2.65	2.65	2.65	2.70	2.75	2.75
1918.....	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917.....	3.00	3.00	3.00	3.20	3.40	4.00	4.50	4.50	4.50	4.50	4.00	4.00
1916.....	1.85	1.90	2.20	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.50	2.60
1915.....	0.95	1.05	1.10	1.15	1.15	1.15	1.20	1.25	1.30	1.35	1.50	1.70
1914.....	1.15	1.20	1.15	1.15	1.10	1.10	1.05	1.05	1.05	1.05	0.95	0.95
1913.....	1.60	1.60	1.60	1.55	1.55	1.55	1.50	1.45	1.35	1.25	1.15	1.15
1912.....	1.15	1.15	1.15	1.15	1.25	1.25	1.35	1.40	1.45	1.50	1.55	1.55
1911.....	1.30	1.30	1.25	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.15	1.15
1910.....	1.60	1.60	1.55	1.55	1.50	1.45	1.40	1.40	1.40	1.35	1.35	1.30
1909.....	1.50	1.50	1.40	1.30	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908.....	1.60	1.55	1.55	1.55	1.55	1.55	1.50	1.50	1.50	1.50	1.50	1.50
1907.....	1.80	1.80	1.80	1.80	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75

No. 24 Black Sheets, Pittsburgh, 1907-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.80c	2.85c	2.85c	2.75c	2.75c	2.70c	2.65c	2.65c	2.65c	2.70c	2.80c	2.85c
1927.....	2.95	2.90	2.90	2.80	2.90	3.00	3.00	3.00	3.00	2.95	2.80	2.75
1926.....	3.35	3.35	3.25	3.25	3.20	3.10	3.10	3.10	*3.05	3.05	3.10	3.10
1925.....	3.50	3.50	3.40	3.35	3.25	3.15	3.15	3.15	3.10	3.10	3.25	3.35
1924.....	3.75	3.75	3.75	3.70	3.65	3.65	3.60	3.50	3.45	3.40	3.45	3.50
1923.....	3.35	3.35	3.55	3.85	3.85	3.85	3.85	3.85	3.75	3.75	3.75	3.75
1922.....	3.00	3.00	3.00	3.10	3.15	3.15	3.15	3.25	3.40	3.50	3.35	3.30
1921.....	4.35	4.20	3.90	3.90	4.00	3.90	3.35	3.05	2.80	3.00	2.95	3.00
1920.....	5.00	6.00	6.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	6.05	4.45
1919.....	4.70	4.70	4.60	4.35	4.35	4.30	4.30	4.35	4.35	4.35	4.35	4.35
1918.....	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1917.....	4.55	4.55	5.05	5.75	7.00	8.15	9.00	9.00	8.75	7.75	5.30	5.00
1916.....	2.55	2.60	2.75	2.90	2.95	2.90	2.90	2.75	2.85	3.20	3.65	4.45
1915.....	1.80	1.80	1.80	1.80	1.80	1.80	1.75	1.85	1.90	2.05	2.20	2.50
1914.....	1.85	1.95	1.95	1.90	1.85	1.80	1.80	1.90	1.95	1.95	1.90	1.80
1913.....	2.30	2.35	2.35	2.35	2.35	2.30	2.25	2.20	2.10	2.00	1.95	1.90
1912.....	1.90	1.85	1.80	1.85	1.95	1.95	2.00	2.05	2.10	2.20	2.25	2.25
1911.....	2.20	2.20	2.20	2.15	2.15	2.00	2.00	1.95	1.90	1.85	1.85	1.90
1910.....	2.40	2.40	2.40	2.35	2.30	2.25	2.20	2.20	2.15	2.15	2.15	2.15
1909.....	2.40	2.40	2.30	2.20	2.20	2.20	2.20	2.20	2.20	2.30	2.40	2.40
1908.....	2.55	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1907.....	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60

*No. 28 gage before Sept. 1, 1926.

Market History —

No. 10 Blue Annealed Sheets, Pittsburgh, 1913-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.10c	2.10c	2.10c	2.05c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c	2.00c
1927.....	2.25	2.20	2.20	2.20	2.25	2.25	2.25	2.25	2.25	2.15	2.10	2.10
1926.....	2.50	2.50	2.50	2.50	2.45	2.35	2.30	2.30	2.30	2.35	2.40	2.40
1925.....	2.70	2.70	2.65	2.55	2.45	2.30	2.30	2.30	2.25	2.25	2.40	2.50
1924.....	2.95	2.90	2.95	2.80	2.80	2.80	2.75	2.70	2.70	2.60	2.60	2.70
1923.....	2.50	2.50	2.70	2.80	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.90
1922.....	2.25	2.25	2.25	2.35	2.40	2.40	2.40	2.45	2.50	2.60	2.60	2.50
1921.....	3.55	3.55	3.05	2.95	3.10	3.00	2.55	2.40	2.30	2.50	2.40	2.25
1920.....	4.05	5.50	5.50	4.85	5.00	5.00	5.00	5.00	5.00	5.00	4.95	3.65
1919.....	3.90	3.90	3.80	3.55	3.55	3.50	3.50	3.55	3.55	3.55	3.55	3.55
1918.....	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
1917.....	4.10	4.35	4.70	5.35	6.65	8.00	8.50	8.50	8.50	7.85	4.75	4.25
1916.....	2.45	2.60	2.85	3.00	3.05	3.10	3.00	3.00	2.95	3.15	3.30	3.90
1915.....	1.30	1.30	1.30	1.30	1.35	1.35	1.35	1.35	1.50	1.60	1.85	2.25
1914.....	1.35	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.40	1.40	1.40	1.35
1913.....	1.70	1.75	1.75	1.75	1.75	1.75	1.70	1.65	1.60	1.55	1.45	1.40

No. 24 Galvanized Sheets, Pittsburgh, 1903-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	3.65c	3.65c	3.75c	3.65c	3.65c	3.55c	3.50c	3.50c	3.50c	3.50c	3.55c	3.60c
1927.....	3.80	3.70	3.70	3.65	3.80	3.80	3.85	3.85	3.85	3.80	3.70	3.60
1926.....	4.60	4.60	4.60	4.60	4.55	4.30	4.30	4.30	*3.95	3.90	3.95	3.95
1925.....	4.75	4.75	4.70	4.55	4.35	4.20	4.20	4.20	4.20	4.25	4.50	4.60
1924.....	4.95	4.90	4.90	4.85	4.80	4.80	4.70	4.60	4.60	4.60	4.60	4.60
1923.....	4.35	4.35	4.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.85	4.90
1922.....	4.00	4.00	4.00	4.10	4.15	4.15	4.15	4.25	4.40	4.50	4.35	4.35
1921.....	5.70	5.50	5.05	4.90	5.00	4.90	4.35	4.05	3.80	4.00	3.95	4.00
1920.....	6.35	7.00	7.25	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.35	5.85
1919.....	6.05	6.05	5.95	5.70	5.70	5.65	5.65	5.70	5.70	5.70	5.70	5.70
1918.....	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1917.....	6.55	6.80	6.80	7.55	8.80	9.95	10.25	10.25	9.70	8.80	6.50	6.25
1916.....	4.75	4.75	4.80	4.85	4.85	4.80	4.35	4.25	4.20	4.45	5.05	6.25
1915.....	2.75	3.00	3.40	3.30	3.40	4.45	4.55	3.95	3.65	3.50	3.90	4.75
1914.....	2.85	2.95	2.95	2.90	2.80	2.75	2.75	2.85	2.95	2.95	2.85	2.80
1913.....	3.45	3.50	3.50	3.50	3.40	3.40	3.30	3.25	3.15	3.05	2.95	2.85
1912.....	3.20	3.20	3.00	3.00	3.10	3.10	3.10	3.30	3.50	3.50	3.50	3.50
1911.....	3.20	3.20	3.20	3.20	3.20	3.00	3.00	3.00	2.80	3.00	3.00	3.20
1910.....	3.70	3.70	3.70	3.70	3.50	3.20	3.20	3.20	3.20	3.20	3.20	3.20
1909.....	3.40	3.30	3.40	3.40	3.40	3.50	3.50	3.50	3.60	3.60	3.70	3.70
1908.....	3.70	3.70	3.70	3.60	3.50	3.50	3.50	3.50	3.30	3.30	3.20	3.20
1907.....	4.00	4.00	4.00	3.80	3.80	3.80	3.70	3.70	3.60	3.60	3.50	3.50
1906.....	3.60	3.60	3.70	3.80	3.80	3.80	3.80	3.90	3.80	4.00	4.00	4.00
1905.....	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1904.....	3.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.50
1903.....	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.50	3.50	3.50

*No. 28 gage before Sept. 1, 1926.

Tin Plate, Pittsburgh, 1903-1928

Per Base Box, 100 lbs., Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.30	$5.35
1927.....	5.50	5.50	5.50	5.50	5.50	5.45	5.50	5.50	5.50	5.30	5.30	5.25
1926.....	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	$550	5.50
1925.....	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1924.....	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1923.....	4.75	4.75	4.95	4.95	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1922.....	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75
1921.....	7.00	7.00	7.00	6.65	6.25	6.25	5.65	5.25	5.15	5.00	4.80	4.75
1920.....	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1919.....	7.35	7.35	7.25	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1918.....	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75
1917.....	6.90	7.00	7.50	7.50	7.90	9.25	10.00	10.00	10.00	10.00	8.20	7.75
1916.....	3.75	3.75	4.15	4.70	5.15	5.55	5.80	6.00	5.60	5.75	6.05	6.50
1915.....	3.10	3.10	3.10	3.20	3.20	3.10	3.10	3.10	3.10	3.10	3.35	3.60
1914.....	3.40	3.40	3.40	3.40	3.40	3.30	3.25	3.45	3.55	3.35	3.15	3.20
1913.....	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.55	3.50	3.40
1912.....	3.40	3.40	3.50	3.50	3.50	3.50	3.50	3.70	3.70	3.70	3.70	3.60
1911.....	3.70	3.70	3.70	3.60	3.60	3.60	3.60	3.50	3.50	3.40	3.40	3.40
1910.....	3.50	3.50	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
1909.....	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.50	3.50	3.50
1908.....	3.60	3.60	3.60	3.60	3.60	3.50	3.50	3.50	3.50	3.50	3.50	3.40
1907.....	3.90	3.90	3.90	3.90	3.80	3.80	3.70	3.70	3.70	3.60	3.60	3.60
1906.....	3.50	3.50	3.50	3.60	3.70	3.70	3.80	3.90	3.90	3.90	4.00	4.00
1905.....	3.50	3.50	3.50	3.50	3.50	3.40	3.40	3.40	3.30	3.30	3.40	3.50
1904.....	3.40	3.40	3.30	3.30	3.20	3.20	3.20	3.10	3.30	3.40	3.50	3.50
1903.....	3.80	3.80	3.90	3.90	3.80	3.80	3.70	3.70	3.60	3.60	3.60	3.50

Plain Wire, Pittsburgh, 1912-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.40c	2.45c	2.50c	2.50c	2.50c	2.50c	2.45c	2.40c	2.40c	2.40c	2.40c	2.50c
1927.....	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
1926.....	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2 50	2.50
1925.....	2.60	2.60	2.60	2.55	2.50	2.45	2.50	2.50	2.50	2.50	2.50	2.50
1924.....	2.75	2.75	2.75	2.75	2.70	2.65	2.60	2.60	2.55	2.50	2.50	2.60
1923.....	2.45	2.60	2.65	2.70	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1922.....	2.25	2.20	2.25	2.25	2.25	2.25	2.25	2.25	2.40	2.45	2.45	2.45
1921.....	3.25	3.20	3.00	3.00	3.00	2.75	2.50	2.50	2.60	2.60	2.60	2.25
1920.....	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.20	3.25	3.25	3.25
1919.....	3.25	3.25	3.20	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.15	3.25
1918.....	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917.....	2.95	2.95	3.10	3.20	3.45	3.60	3.95	3.95	3.95	3.85	3.25	3.25
1916.....	1.95	2.10	2.25	2.25	2.45	2.45	2.45	2.55	2.55	2.60	2.80	2.95
1915.....	1.30	1.35	1.40	1.40	1.35	1.35	1.40	1.40	1.55	1.60	1.70	1.90
1914.....	1.35	1.40	1.40	1.40	1.35	1.30	1.30	1.35	1.35	1.40	1.40	1.30
1913.....	1.55	1.55	1.55	1.60	1.60	1.60	1.50	1.45	1.45	1.40	1.40	1.35
1912.....	1.35	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.50	1.55	1.55	1.55

Market History —

Cold Finished Steel Bars, Pittsburgh, 1920-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.30c	2.25c	2.25c	2.20c	2.20c	2.15c	2.10c	2.15c	2.20c	2.20c	2.20c	2.20c
1927.....	2.35	2.35	2.40	2.40	2.40	2.35	2.30	2.30	2.20	2.15	2.10	2.10
1926.....	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.45	2.40	2.40
1925.....	2.80	2.80	2.75	2.70	2.70	2.60	2.55	2.50	2.50	2.45	2.50	2.50
1924.....	3.00	3.00	3.00	3.00	3.00	2.90	2.85	2.80	2.75	2.70	2.70	2.80
1923.....	2.50	2.65	2.85	3.00	3.25	3.25	3.25	3.25	3.25	3.25	3.00	2.90
1922.....	2.00	1.90	1.85	1.85	2.00	2.00	2.05	2.15	2.50	2.50	2.50	2.50
1921.....	3.60	3.60	3.10	3.05	3.10	3.00	2.75	2.50	2.40	2.25	2.15	2.00
1920.....	3.65	3.85	4.50	5.25	4.40	4.50	4.10	4.55	4.25	4.10	4.00	3.60

Wire Nails, Pittsburgh, 1907-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.50c	2.60c	2.65c	2.60c	2.60c	2.60c	2.55c	2.55c	2.55c	2.55c	2.55c	2.65c
1927.....	2.65	2.60	2.55	2.55	2.50	2.55	2.55	2.55	2.55	2.55	2.50	2.50
1926.....	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
1925.....	2.85	2.85	2.85	2.20	2.25	2.75	2.65	2.65	2.65	2.65	2.65	2.65
1924.....	3.00	3.00	3.00	3.00	2.95	2.90	2.85	2.85	2.80	2.75	2.75	2.85
1923.....	2.70	2.75	2.90	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
1922.....	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.65	2.70	2.70	2.70
1921.....	3.25	3.00	3.00	3.25	3.25	3.00	2.75	2.75	2.90	2.90	2.90	2.50
1920.....	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1919.....	3.50	3.50	3.45	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.45	3.50
1918.....	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917.....	3.00	3.00	3.15	3.20	3.50	3.65	4.00	4.00	4.00	3.90	3.50	3.50
1916.....	2.15	2.20	2.40	2.40	2.50	2.50	2.50	2.60	2.60	2.65	2.85	3.00
1915.....	1.50	1.55	1.60	1.60	1.55	1.55	1.60	1.60	1.70	1.75	1.85	2.00
1914.....	1.55	1.60	1.60	1.60	1.60	1.55	1.55	1.55	1.60	1.60	1.60	1.50
1913.....	1.75	1.75	1.75	1.80	1.80	1.80	1.75	1.70	1.65	1.60	1.60	1.60
1912.....	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.65	1.70	1.70	1.75	1.75
1911.....	1.70	1.75	1.80	1.80	1.75	1.80	1.70	1.70	1.65	1.65	1.55	1.55
1910.....	1.85	1.85	1.85	1.85	1.80	1.80	1.70	1.70	1.70	1.70	1.65	1.70
1909.....	1.95	1.95	1.95	1.95	1.60	1.70	1.70	1.80	1.80	1.80	1.80	1.85
1908.....	2.05	2.05	2.05	2.05	2.05	2.00	1.95	1.95	1.95	1.95	1.95	1.95
1907.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.05	2.05	2.05	2.05

Cold Rolled Strip, Pittsburgh, 1910-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	3.00c	3.10c	3.15c	*2.75c	2.75c	2.75c	2.75c	2.70c	2.75c	2.75c	2.80c	2.85c
1927.....	3.10	2.90	2.95	3.00	3.00	3.25	3.25	3.25	3.15	2.95	2.95	3.00
1926.....	3.90	3.90	3.90	3.85	3.75	3.70	3.65	3.50	3.50	3.50	3.25	3.25
1925.....	4.10	4.15	4.05	4.00	3.85	3.65	3.75	3.75	3.75	3.75	3.90	3.90
1924.....	5.00	4.80	4.80	4.75	4.50	4.50	4.35	4.20	4.00	4.00	4.00	4.15
1923.....	4.50	4.65	4.80	5.15	5.25	5.25	5.00	5.00	5.00	5.00	5.00	4.75
1922.....	3.50	3.50	3.50	3.60	3.70	3.95	4.00	4.00	4.25	4.50	4.50	4.50
1921.....	6.25	6.25	5.65	5.50	5.50	5.00	4.40	3.90	3.75	3.75	3.80	3.75
1920.....	5.65	7.00	8.80	8.50	8.50	8.50	8.50	8.50	7.35	8.50	8.00	6.85
1919.....	6.25	6.25	6.10	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65
1918.....	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1917.....	6.50	6.50	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.50	6.50
1916.....	4.25	4.65	5.50	6.00	6.00	6.00	6.00	6.00	6.00	6.50	6.50	6.50
1915.....	2.75	2.75	2.75	2.75	2.75	2.85	2.85	3.00	3.10	3.25	3.50	3.75
1914.....	3.05	3.05	3.05	3.05	3.05	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1913.....	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.05
1912.....	2.95	2.95	2.95	2.95	3.00	3.05	3.05	3.05	3.05	3.15	3.20	3.25
1911.....	2.95	2.95	3.25	3.25	3.25	2.95	2.95	2.95	2.95	2.95	2.95	2.95
1910.....	.....	.....	.....	.....	.....	.....	2.95	2.95	2.95	2.95	2.95	2.95

*April, 1928, and subsequently, prices are for 3 tons or over, instead of less than 3 tons.

Hot Rolled Strip, Wide, Pittsburgh, 1917-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	1.85c	1.85c	1.90c	1.90c	1.85c	1.85c	1.90c	1.85c	1.80c	1.80c	1.80c	1.85c
1927.....	2.20	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.00	1.90
1926.....	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1925.....	2.35	2.40	2.35	2.20	2.20	2.20	2.20	2.20	2.20	2.25	2.30	2.30
1924.....	3.00	2.95	2.85	2.75	2.60	2.55	2.50	2.50	2.45	2.35	2.25	2.35
1923.....	2.75	2.85	3.10	3.30	3.30	3.30	3.20	3.15	3.10	3.00	3.00	2.75
1922.....	2.00	1.80	1.80	1.95	2.05	2.35	2.50	2.50	2.75	2.90	2.90	2.80
1921.....	3.30	3.30	2.85	2.75	2.75	2.70	2.50	2.30	2.15	2.15	2.25	2.00
1920.....	3.70	4.80	5.25	5.45	5.50	5.50	5.50	5.50	5.50	5.50	5.00	3.90
1919.....	3.80	3.55	3.30	3.25	3.05	3.05	3.10	3.30	3.30	3.30	*3.30	*3.30
1918.....	4.50	4.50	4.50	4.50	4.25	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917.....	.....	.....	.....	.....	.....	7.25	7.25	7.25	7.00	7.00	5.25	4.50

*First quarter 1920 delivery.

Bands, Pittsburgh, 1916-1928

This designation was superseded in 1928 by narrow hot rolled strip.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.10c	2.10c	2.10c	2.05c	2.00c	2.00c	2.00c	1.95c	1.95c	2.00c	1.90c	1.90c
1927.....	2.40	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.25	2.20	2.15
1926.....	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925.....	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.45	2.50	2.50
1924.....	3.00	3.00	2.85	2.75	2.75	2.70	2.60	2.60	2.40	2.40	2.40	2.40
1923.....	2.75	2.85	3.10	3.30	3.30	3.30	3.15	3.15	3.15	3.15	3.00	2.90
1922.....	1.75	1.75	1.70	1.85	2.05	2.35	2.45	2.55	2.75	2.90	2.90	2.80
1921.....	3.05	3.05	2.70	2.75	2.75	2.70	2.35	2.20	2.20	2.25	2.15	2.00
1920.....	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
1919.....	3.30	3.30	3.25	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
1918.....	2.90	2.90	2.90	2.90	3.00	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917.....	3.00	3.00	3.35	3.35	3.60	5.50	6.00	6.00	6.00	6.00	4.30	2.90
1916.....	1.85	2.05	2.35	2.50	2.50	2.50	2.50	2.60	2.60	2.60	2.75	2.90

Market History —

Hoops, Pittsburgh, 1908-1928

This designation was superseded in 1928 by narrow hot rolled strip.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.10c	2.15c	2.20c	2.15c	2.15c	2.10c	2.10c	2.05c	2.10c	2.10c	2.00c	2.00c
1927.....	2.40	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.25	2.20	2.15
1926.....	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925.....	2.45	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.45	2.50	2.50
1924.....	3.00	3.00	2.85	2.75	2.75	2.70	2.60	2.60	2.55	2.50	2.50	2.50
1923.....	2.75	2.85	3.10	3.30	3.30	3.30	3.15	3.15	3.15	3.15	3.00	2.90
1922.....	1.95	1.85	1.80	1.95	2.05	2.35	2.45	2.55	2.75	2.90	2.90	2.80
1921.....	3.05	3.05	2.70	2.75	2.75	2.70	2.45	2.40	2.30	2.25	2.20	2.15
1920.....	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
1919.....	3.30	3.30	3.25	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
1918.....	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917.....	3.50	3.50	3.90	4.10	4.70	5.75	6.00	6.00	6.00	6.00	4.60	3.50
1916.....	2.00	2.25	2.55	2.75	2.75	2.75	2.75	2.80	3.00	3.00	3.25	3.25
1915.....	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.30	1.40	1.50	1.75	1.95
1914.....	1.40	1.30	1.30	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
1913.....	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.50	1.40
1912.....	1.30	1.25	1.25	1.25	1.25	1.25	1.35	1.40	1.40	1.45	1.50	1.50
1911.....	1.50	1.50	1.45	1.45	1.45	1.45	1.40	1.40	1.35	1.35	1.30	1.30
1910.....	1.60	1.60	1.60	1.60	1.50	1.55	1.55	1.55	1.50	1.50	1.50	1.50
1909.....	1.80	1.75	1.60	1.60	1.50	1.40	1.40	1.40	1.50	1.50	1.50	1.55
1908.....	2.00	2.00	2.00	2.00	2.00	1.90	1.80	1.80	1.80	1.80	1.80	1.80

Angle Bars, Chicago, 1914-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c	2.75c
1927.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1926.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1925.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1924.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1923.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1922.....	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.50	2.75	2.75	2.75
1921.....	2.75	2.75	2.75	2.70	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.55
1920.....	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1919.....	3.00	3.00	3.00	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1918.....	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.15
1917.....	2.25	2.25	2.35	2.75	2.95	3.25	3.45	3.25	3.25	3.25	3.25	3.25
1916.....	1.50	1.50	1.50	1.50	1.90	2.00	2.00	2.00	2.00	2.15	2.25	2.25
1915.....	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1914.....	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50

Tie Plates, Chicago, 1915-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.25c	2.25c	2.15c	2.15c	2.15c	2.15c	2.15c	2.15c	2.15c	2.15c	2.15c	2.15c
1927.....	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.25	2.25
1926.....	2.30	2.25	2.25	2.25	2.25	2.25	2.25	2.30	2.35	2.35	2.35	2.35
1925.....	2.35	2.45	2.45	2.40	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35
1924.....	2.60	2.60	2.60	2.60	2.60	2.60	2.55	2.45	2.45	2.35	2.35	2.35
1923.....	2.40	2.45	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
1922.....	1.90	1.85	1.75	1.80	1.85	1.85	1.85	2.00	2.20	2.35	2.35	2.35
1921.....	3.00	3.00	3.00	2.75	2.50	2.50	2.40	2.15	2.00	2.00	2.00	1.90
1920.....	2.75	2.75	2.75	2.75	2.75	2.75	2.80	3.00	3.00	3.00	3.00	3.00
1919.....	3.00	3.00	3.00	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1918.....	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917.....	2.75	2.75	2.90	3.00	3.00	3.00	3.40	3.50	3.50	3.50	3.50	3.45
1916.....	1.80	2.05	2.25	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.75
1915.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.50	1.70	1.80

Track Bolts, Chicago, 1914-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c	3.80c
1927.....	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80	3.80	3.80
1926.....	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1925.....	3.90	4.00	4.00	4.00	3.95	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1924.....	4.10	4.10	4.10	4.10	4.10	4.10	3.90	3.80	3.80	3.80	3.80	3.80
1923.....	3.90	4.05	4.15	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
1922.....	3.60	3.50	3.50	3.60	3.90	3.90	3.60	3.60	3.80	3.85	3.85	3.85
1921.....	5.00	5.00	5.00	4.85	4.75	4.45	4.40	4.15	3.65	3.65	3.65	3.60
1920.....	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.75	4.95	5.00	5.00	5.00
1919.....	4.90	4.90	4.90	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
1918.....	4.90	4.85	5.05	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10
1917.....	4.25	4.50	4.50	4.55	5.00	5.05	5.55	5.25	5.25	5.25	5.25	5.15
1916.....	2.60	2.65	3.20	3.25	3.25	3.25	3.25	3.25	3.25	3.60	4.20	4.25
1915.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.10	2.10	2.35	2.50
1914.....	2.05	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Market History —

Railroad Spikes, Pittsburgh, 1916-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.70c	2.75c	2.75c	2.80c	2.80c	2.80c	2.80c	2.80c	2.80c	2.80c	2.80c	2.80c
1927.....	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1926.....	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1925.....	2.90	2.90	2.85	2.80	2.80	2.80	2.80	2.75	2.75	2.80	2.80	2.80
1924.....	3.05	3.05	3.05	3.00	2.95	2.90	2.80	2.80	2.75	2.70	2.75	2.80
1923.....	2.85	2.90	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.05
1922.....	2.25	2.15	2.05	2.20	2.25	2.30	2.25	2.30	2.80	2.80	2.75	2.75
1921.....	3.65	3.65	3.30	3.30	3.25	3.25	3.00	2.75	2.45	2.35	2.30	2.25
1920.....	3.45	3.70	3.95	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.75
1919.....	3.65	3.65	3.55	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35
1918.....	4.00	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1917.....	3.40	3.40	3.50	3.65	3.90	4.20	4.70	6.20	6.50	6.15	5.00	4.75
1916.....	2.15	2.25	2.50	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	3.25

Structural Rivets, Pittsburgh, 1913-1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	2.75c	2.75c	2.80c	2.90c	2.90c	2.90c	2.90c	2.85c	2.80c	2.80c	2.80c	2.80c
1927.....	2.35	2.30	2.30	2.75	2.75	2.75	2.75	2.85	2.85	2.75	2.75	2.75
1926.....	2.55	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925.....	2.60	2.55	2.50	2.50	2.45	2.40	2.45	2.40	2.40	2.40	2.60	2.60
1924.....	2.85	2.75	2.75	2.65	2.60	2.55	2.50	2.50	2.55	2.60	2.60	2.60
1923.....	3.00	3.00	3.25	3.25	3.25	3.25	3.15	3.00	3.00	3.00	2.75	2.90
1922.....	2.25	2.00	2.00	2.05	2.20	2.35	2.40	2.45	3.00	3.00	3.00	3.00
1921.....	4.15	3.90	3.70	3.60	3.30	3.00	2.70	2.35	2.30	2.40	2.30	2.30
1920.....	4.15	4.40	4.50	4.50	4.50	4.50	4.50	4.50	4.60	4.75	4.75	4.50
1919.....	4.40	4.20	4.20	3.70	3.70	3.70	3.70	3.90	3.90	3.90	4.00	4.05
1918.....	4.65	4.65	4.65	4.65	4.60	4.40	4.40	4.40	4.40	4.40	4.40	4.40
1917.....	4.25	4.25	4.50	4.75	5.05	5.25	5.25	5.25	5.25	5.25	5.00	4.65
1916.....	2.60	2.75	3.10	3.35	3.90	4.25	4.05	4.00	4.00	4.00	4.10	4.25
1915.....	1.45	1.45	1.45	1.45	1.45	1.50	1.50	1.50	1.60	1.75	2.30	2.45
1914.....	1.60	1.60	1.60	1.60	1.60	1.55	1.50	1.50	1.55	1.50	1.45	1.45
1913.....	2.20	2.20	2.20	2.20	2.15	2.15	2.10	2.00	2.00	1.90	1.80	1.75

Cast Iron Pipe, New York, 1915-1928

6-inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$37.15	$36.75	$36.75	$37.25	$37.65	$38.25	$38.08	$37.60	$37.60	$37.10	$37.20	$38.60
1927.....	49.50	49.50	49.50	49.50	48.60	47.95	46.00	44.00	38.25	36.90	37.25	37.25
1926.....	51.50	51.50	51.50	52.75	51.50	51.50	51.50	51.50	51.50	51.50	51.50	51.50
1925.....	61.05	61.05	60.05	58.15	58.05	57.05	57.05	57.05	56.50	57.05	57.05	57.05
1924.....	66.10	66.10	66.10	66.10	66.10	65.10	65.10	64.10	64.10	64.10	62.10	60.60
1923.....	56.50	57.30	58.40	58.70	59.00	59.00	59.00	59.20	63.60	63.60	62.80	66.60
1922.....	47.30	47.30	47.60	48.80	48.80	49.80	53.30	54.50	55.30	55.30	55.30	55.30
1921.....	63.30	63.30	63.30	63.30	61.30	52.70	48.55	47.05	45.30	47.55	47.30	47.30
1920.....	67.30	70.30	71.30	73.30	76.30	76.30	76.30	76.30	77.20	77.20	77.20	77.20
1919.....	66.20	62.70	61.65	57.70	56.70	52.70	52.70	53.10	54.30	56.70	58.30	61.30
1918.....	55.35	55.35	55.35	55.35	56.55	61.35	62.30	62.50	62.70	67.50	67.70	67.70
1917.....	41.50	41.50	41.90	51.25	55.50	60.75	65.50	65.50	65.50	56.50	56.10	54.75
1916.....	29.00	29.40	29.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	34.50	41.00
1915.....	20.00	20.00	20.25	20.50	20.50	20.50	21.75	22.15	23.40	24.00	25.00	26.40

Cast Iron Pipe, Chicago, 1915-1928

6-inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$36.20	$36.20	$36.70	$38.20	$39.00	$39.00	$41.45	$42.00	$42.20	$42.70	$45.00	$45.20
1927.....	45.70	43.70	44.00	44.20	43.20	42.80	42.20	38.95	36.20	34.30	35.30	35.30
1926.....	48.70	49.20	49.20	49.20	49.45	48.95	47.45	47.45	47.80	47.20	47.20	47.20
1925.....	49.00	50.20	48.20	46.10	46.95	47.95	48.20	49.20	49.45	49.20	50.20	50.20
1924.....	56.00	57.20	57.20	56.95	55.40	55.20	52.20	52.70	52.20	50.00	48.00	47.00
1923.....	51.20	53.20	53.70	55.20	57.20	57.20	59.20	60.45	59.20	57.95	56.85	59.20
1922.....	41.60	42.10	43.00	43.85	44.70	46.60	45.55	45.20	47.85	52.20	51.20	51.20
1921.....	64.10	64.10	64.10	64.10	64.10	51.50	47.60	44.35	42.90	42.60	42.60	42.60
1920.....	67.55	71.30	72.80	74.40	76.80	76.80	76.80	76.80	81.50	83.10	83.10	83.10
1919.....	64.30	61.80	60.55	56.80	54.80	51.80	52.60	54.80	55.80	59.80	59.80	63.80
1918.....	54.30	54.30	54.30	54.30	55.50	60.80	62.05	61.85	61.80	66.80	66.80	66.80
1917.....	41.00	41.50	45.70	52.50	55.50	60.75	65.50	65.50	65.50	57.75	52.10	53.50
1916.....	29.20	29.50	29.50	30.50	30.50	30.50	30.50	30.50	31.00	31.50	35.00	40.50
1915.....	23.40	23.00	23.00	23.00	23.00	23.00	24.00	24.00	24.70	25.75	26.90	27.90

Cast Iron Pipe, Birmingham, 1915-1928

6-inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928.....	$29.00	$29.00	$28.50	$30.00	$33.50	$31.00	$32.50	$34.00	$34.00	$35.00	$36.40	$37.00
1927.....	36.00	36.00	36.50	36.00	36.50	34.80	34.00	30.75	29.80	28.75	29.00	29.00
1926.....	42.00	41.25	40.24	40.00	50.00	40.00	40.00	40.00	39.40	40.00	39.00	38.00
1925.....	40.00	40.00	40.00	39.60	38.50	40.00	40.00	41.00	41.00	41.75	42.00	42.00
1924.....	46.80	47.50	48.00	48.00	48.00	48.00	47.00	47.00	45.00	44.40	46.00	40.00
1923.....	43.00	45.00	45.50	46.75	49.00	49.00	49.00	49.00	49.00	49.00	49.00	51.00
1922.....	35.00	34.00	33.00	34.15	34.70	37.00	37.00	37.30	40.00	43.00	43.00	43.00
1921.....	55.00	55.00	55.00	55.00	55.00	42.50	40.00	39.50	38.00	36.50	32.50	35.00
1920.....	60.00	64.50	66.00	67.00	70.00	70.00	70.00	70.00	72.40	74.00	74.00	74.00
1919.....	58.75	55.00	54.50	53.00	52.00	48.00	48.00	48.00	48.00	50.00	53.00	56.70
1918.....	49.00	49.00	49.00	49.00	50.20	55.00	55.00	55.00	55.00	60.00	60.00	60.05
1917.....	36.00	36.00	37.40	42.40	47.20	55.00	55.00	55.00	55.75	47.25	45.00	46.00
1916.....	24.00	24.50	25.00	25.00	25.00	25.00	25.00	25.50	25.50	25.50	28.40	35.00
1915.....	19.50	19.50	19.50	19.50	19.25	18.65	19.00	19.00	19.40	20.75	21.90	22.65

Shipyard of Palmer's Shipbuilding & Iron Co., Ltd., Yarrow-on-Tyne, England

European Market Reviews for 1928

Reports by Iron Trade Review
Staff Correspondents

Great Britain
Italy

Belgium and Luxemburg
Germany

France
Eastern Europe

European Iron and Steel Domestic Prices in 1928

At Works or Furnace

British Prices in Pounds Sterling Per Gross Ton

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
Foundry No. 3 pig iron, Silicon 2.50-3.00	3- 5-0	3- 5-0	3- 5-3	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0
Basic pig iron	.....	.....	.....	.....	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0
Furnace coke	0-12-0	0-12-0	0-12-0	0-12-0	0-12-9	0-13-0	0-13-0	0-13-0	0-13-0	0-13-0	0-13-0	0-13-0
Billets	5-15-0	5-15-0	5-15-0	5-15-0	5-17-6	5-19-3	6- 0-0	6- 0-0	6- 0-0	6- 7-0	6- 7-6	6- 7-6
Standard rails	8- 0-0	8- 0-0	8- 0-0	8- 0-0	8- 0-0	8- 0-0	8- 1-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0
Merchant bars	7-10-0	7-10-0	7-10-0	7- 9-6	7- 2-6	7- 2-6	7- 4-6	7- 5-0	7- 5-0	7-14-6	7-15-0	7-15-0
Shapes	7-12-6	7-15-0	7-17-6	7-17-6	7-17-6	7-17-6	7-17-6	7-17-6	7-17-6	7-17-6	7-17-6	7-17-6
Plates, ship, bridge and tank*	8- 7-6	8-10-0	8-12-6	8-12-6	8-12-6	8-11-3	8-12-6	8-12-6	8-12-6	8-12-6	8-12-6	8-12-6
Sheets, black, 24 gage	11-10-0	11-10-0	11-10-0	11- 6-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0
Sheets, galvanized, 24 gage, corrugated	13- 0-0	13- 3-9	13- 7-6	13- 3-6	13- 2-6	13- 7-6	13- 7-6	13- 7-6	13-11-3	13-14-0	13-13-0	13-12-6
Plain wire	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0
Bands and strips	10-10-0	10-10-0	10-10-0	10- 9-0	10- 5-0	10- 5-0	10- 5-0	10- 5-0	10- 5-0	10- 5-0	10- 0-0	10- 0-0

*Delivered.

German Prices in Marks Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry No. 3 pig iron, Silicon 2.50-3.00	78	78	78	78	78	78	78	78	78	78	78	78
Basic pig iron	88	88	88	88	88	88	88	88	88	88	88	88
Furnace coke	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
Billets	112.50	115	115	116	118	120	121	121	121	121	121	121
Standard rails	140	140	140	140	140	140	140	140	140	140	140	140
Merchant bars	135.50	137	137	137	139	141	141	141	141	141	141	141
Shapes	132.50	134	134	134	136	138	138	138	138	138	138	138
Plates, ship, bridge and tank	149	153	153	153	...	158	158	158	158	158	158	158
Sheets, black, 24 gage	220	220	220	220	222.50	225	225	225	225	225	225	225
Sheets, galvanized, 24 gage, corrugated	350	350	350	350	350	350	350	350	350	350	350	350
Plain wire	195	215	215	215	215	230	230	230	230	230	230	230
Bands and strips	156	158	158	158	161	164	164	164	164	164	164	164

French Prices in French Francs Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry No. 3 pig iron, Silicon 2.50-3.00	427	440	445	445	445	445	440	440	440	440	450	450
Basic pig iron	462	475	480	480	480	480	475	475	475	475	485	485
Furnace coke	155	150	150	150	150	150	150	150	150	150	150	150
Billets	509	532	550	560	565	565	565	565	565	565	590	590
Standard rails	755	755	755	755	820	820	820	810	810	810	810	810
Merchant bars	587	640	675	676	677	682	700	710	712	726	735	740
Shapes	550	597	635	650	650	650	650	650	656	675	675	675
Plates, ship, bridge and tank	724	747	785	799	840	840	850	850	855	855	855	855
Sheets, black, 24 gage	1345	1407	1510	1510	1520	1505	1580	1620	1620	1620	1620	1620
Sheets, galvanized, 24 gage, corrugated	1865	1855	1885	1900	1900	1900	1900	1920	1945	1945	1970	2050
Plain wire	915	950	950	950	950	950	950	950	955	1033	1075	1075
Bands and strips	737	756	775	787	770	775	780	785	790	830	850	850

Belgian Prices in Belgian Francs Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry No. 3 pig iron, Silicon 2.50-3.00	590	590	590	585	587	590	585	585	590	592	595	595
Basic bessemer pig iron	541	547	540	535	540	540	540	540	560	595	595	595
Furnace coke	185	185	185	185	185	185	185	185	185	185	185	185
Billets	800	800	825	850	875	865	900	925	945	985	955	925
Standard rails	1100	1100	1100	1100	1100	1100	1100	1100	1210	1250	1250	1250
Merchant bars	872	914	945	933	965	1020	1000	1030	1100	1087	1080	1085
Shapes	850	902	915	894	915	914	900	950	920	945	945	935
Plates, ship, bridge and tank	1086	1160	1215	1109	1130	1140	1125	1150	1150	1147	1135	1120
Sheets, black, 24 gage	1750	1775	1900	1850	1840	1870	1880	1880	1885	1900	1850	1800
Sheets, galvanized, 24 gage, corrugated	2825	2825	2925	2925	2530	2495	2975	2975	2975	2975	2975	2975
Plain wire	1400	1400	1410	1450	1450	1500	1500	1500	1550	1550	1585	1600
Bands and strips	1105	1230	1230	1188	1225	1345	1285	1315	1400	1450	1435	1325

Europe on Road To Prosperity

Greater Confidence Determines More Buying—General Advance of World Steel Prices—Entente and Syndicates Justify Their Existence—Signs of American Competition Noted

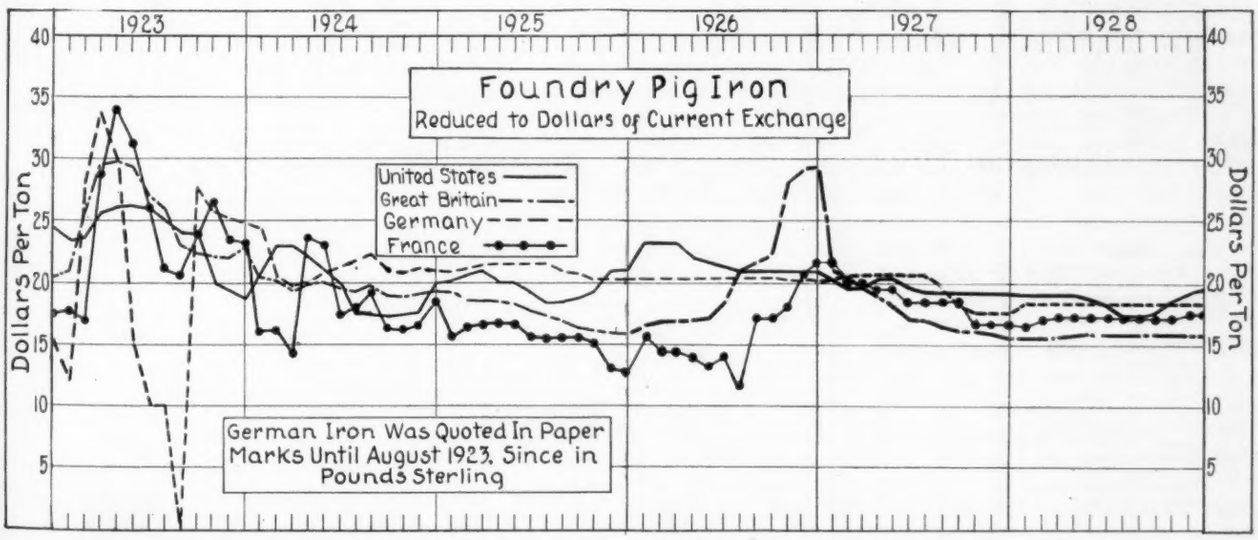
By Vincent Delport
European Manager, Iron Trade Review

AT NO time since the establishment of peace have the nations of continental Europe attained a degree of prosperity such as was reached in 1928. Nor was prosperity ever based on more solid foundations. Two notable exceptions should be made with regard to Germany and Great Britain. These exceptions confirm the rule, because notwithstanding a serious drop in the output of both these countries, Europe as a whole produced at least as much steel in 1928 as in 1927. Geographically, Britain enjoys certain advantages as a steel-producing nation, but the country is handicapped by the lower production costs of continental works. This is partly due to continental organization, but, following the lead of the coal owners, the British steelmakers are making progress toward rationalization. A tariff on imported steel is considered more seriously but its enactment is uncertain.

The monument of industrial efficiency which Germany was building during recent years has been rudely shaken, but the foundations are sound. A year ago, progress was retarded by the enforcement of the eight-hour day. Adjustments then were made. At the end of 1928 labor demands for higher wages caused a more serious setback. Underlying factors are the increase of the working population and the need of fresh capital. It is vitally important for Germany to make further adjustments and that labor and capital should co-operate. There is no lack of incentives, and one can now look for improvement.

An outstanding feature of the iron and steel trade in 1928 was the almost continuous increase in world prices, which, at the end of the year, reached a level as high as if not higher than before the war. More stable political conditions throughout Europe, the final fixation of the remaining leading currencies, the increasing tendency of peoples to look forward instead of backward, these factors have determined an atmosphere of greater confidence and a desire to improve conditions of living that have resulted in a growing demand for essential materials. Checking unreasonable impulses to inflate prices, international agreements and national syndicates, supported by the European steel entente, have had a stabilizing influence generally recognized.

Industrial leaders are entering upon the activities of the coming year with a confident outlook, but without being blind to existing difficulties. Some observers believe that during the period of rising prices, consumers have covered beyond requirements, and a lull will follow. Safeguarding of the British industry looms in the distance. A more immediate preoccupation of European producers is the increased competition of America in certain markets, and the signs of a more aggressive policy right in Europe. The logical outcome should be further concerted action among continental steelmakers, accompanied by the beneficial effects of healthy competition.



European Iron and Steel Export Prices in 1928

F.o.b. Ports of Shipment

British Prices in Pounds Sterling Per Gross Ton

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, No. 3, Middlesbrough	3- 5-0	3- 5-0	3- 5-6	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0	3- 6-0
Basic, Middlesbrough	.....	.....	.....	.....	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0
Scotch Foundry	3-11-3	3-10-0	3-10-0	3- 9-9	3- 9-0	3- 9-0	3- 9-0	3- 9-0	3- 9-0	3- 9-9	3-10-0	3-10-0
Hematite, East Coast	3-10-3	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0	3- 8-9	3- 8-6	3- 9-0	3- 9-9	3-10-3	3-11-0
SEMIFINISHED STEEL												
Billets	5-15-0	5-15-0	5-15-0	5-15-0	5-17-6	6- 0-0	6- 0-0	6- 0-0	6- 0-0	6- 6-0	6- 6-9	6- 7-6
Wire rods	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	8-15-0	9- 1-9	9- 5-0	8-10-0	8-11-0	8-12-6	8-12-6
FINISHED STEEL												
Standard rails	7-15-0	7-15-0	7-15 0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0
Merchant bars	7- 5-0	7- 5-0	7- 5-0	7- 5-0	7- 0-0	7- 0-0	7- 2-3	7- 2-6	7- 2-6	7-12-0	7-13-9	7-15-0
Structural shapes	7- 2-6	7- 5-0	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-5	7- 7-6
Plates, ship, bridge and tank	7-17-6	8- 0-0	8- 2-6	8- 2-6	8- 2-6	8- 2-6	8- 2-6	8- 2-6	8- 2-6	8- 2-6	8- 2-6	8- 2-6
Sheets, black, 24 gage	11- 0-0	11- 0-0	11- 0-0	10-16-0	10- 0-0	10- 0-0	10- 0-0	10- 0-0	10- 0-0	10- 0-0	10- 0-0	10- 0-0
Sheets, galvanized, 24 gage, corrugated	13- 0-0	13- 3-0	13- 8-9	13- 3-6	13- 2-6	13- 7-6	13- 7-6	13- 7-6	13- 8-9	13-11-6	13-10-6	13-10-0
Bands and strips	10-10-0	10-10-0	10-10-0	10- 9-0	10- 5-0	10- 5-0	10- 5-0	10- 5-0	10- 5-0	10- 5-0	10- 0-0	10- 0-0
Plain wire, base	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0
Galvanized wire, base	13-10-0	13-10-0	13-10-0	13-10-0	13-10-0	13-10-0	13-10-0	13-10-0	13-10-0	13-10-0	13-10-0	13-10-0
Wire nails, base	11-10-0	11-10-0	11-10-0	11-10-0	11-10-0	11-10-0	11- 2-6	11- 0-0	11- 0-0	11- 0-0	11- 0-0	11- 0-0
Tinplate, base box 108 pounds	0-18-0	0-18-0	0-18-0	0-18-3	0-18-6	0-18-8	0-18-4	0-18-3	0-18-3	0-18-3	0-18-0	0-18-0
Furnace coke	0-12-0	0-12-0	0-12-0	0-12-0	0-12-9	0-13-0	0-13-0	0-13-0	0-13-0	0-13-0	0-13-0	0-13-0
Ferromanganese††	20-10-0	20-10-0	20-10-0	20-10-0	20-10-0	21-10-0	21-10-0	21-10-0	21-14-0	21-14-0	21-13-3	21-13-0

††Delivered Atlantic seaboard, duty-paid.

German Prices in Pounds Per Metric Ton

F.o.b. Rotterdam or Northern Sea Ports

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec £ s d
PIG IRON												
Foundry, No. 3, Silicon 2.50-3.00	3- 1-0	3- 3-0	3- 4-3	3- 4-0	3- 4-0	3- 4-0	3- 4-9	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0
Basic bessemer	3- 0-0	3- 0-9	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0
Hematite	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0	3-10-0
SEMIFINISHED STEEL												
Billets	4- 7-0	4-10-0	4-13-0	4-12-0	4-13-0	4-15-0	4-17-0	4-17-3	4-18-0	5- 0-0	5- 0-0	5- 0-0
Wire rods	5-10-6	5-10-0	5-11-9	5-15-0	5-15-0	5-16-9	6- 0-0	6- 0-6	6- 2-3	6- 2-6	6- 2-6	6 -2-6
FINISHED STEEL												
Standard rails	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6-10-0	6-10-0	6-10-0
Merchant bars	4-17-0	5- 0-6	5- 7-0	5- 6-0	5- 9-3	5-16-0	5-13-6	5-17-6	6- 2-9	6- 5-0	6- 5-6	6- 5-0
Structural shapes	4- 9-6	4-10-0	4-13-0	4-15-0	4-15-0	4-18-0	4-17-9	4-17-6	4-19-9	5- 0-0	5- 1-6	5- 2-0
Plates, ship, bridge and tank	6- 7-6	6- 2-6	6- 5-0	6-13-0	6-10-0	6- 6-0	6- 8-0	6- 8-0	6- 8-9	6- 9-0	6- 7-9	6- 8-0
Sheets, black, 24 gage	13- 0-0	13- 0-0	13- 0-0	12- 0-0	12- 0-0	12- 0-0	11- 0-0	10-15-0	10-15-0	10- 0-0	10- 6-3	11- 5-0
Sheets, galvanized, 24 gage, corrugated	16- 0-0	16- 0-0	16- 0-0	16- 0-0	15-15-0	15-15-0	15-15-0	15-15-0	15-12-0	14- 0-0	13-17-9	15-10-0
Bands and strips	6-15-0	6-15-0	6-13-0	5-11-0	5-16-0	6- 6-3	6-10-0	6-10-0	6-13-9	6-15-0	6-15-0	6-15-0
Plain wire, base	7- 4-0	7- 3-0	7- 3-0	7- 4-6	7- 5-0	7- 4-3	7- 2-0	7- 2-9	7- 5-0	7- 7-0	7-11-3	7-15-0
Galvanized wire, base	9- 6-6	9- 3-0	9- 3-0	9- 4-6	9- 5-0	9- 4-3	9- 2-0	9- 2-3	9- 3-0	9- 5-6	9-11-3	9-15-0
Wire nails, base	7-16-0	7-12-0	7-12-0	8- 6-6	8-10-0	7-12-6	7-10-0	7-10-0	7-10-0	7-14-6	8- 0-0	8- 0-0
Tinplate, base box 108 pounds	1- 8-0	1- 8-0	1- 8-0	1- 8-0	1- 8-0	1- 8-0	1- 8-0	1- 8-0	1- 8-0	1- 8-0	1- 8-0	1- 8-0
Ferromanganese	15- 0-0	15- 0-0	15- 0-0	15 -0-0	15- 0-0	15- 0-0	15- 0-0	15- 0-0	15- 0-0	15- 0-0	15- 0-0	15- 0-0

French Prices in Francs or Sterling Per Metric Ton

F.o.b. Channel Ports or Antwerp

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, No. 3, Silicon 2.50-3.00	3- 2-0	3- 3-3	3- 4-0	3- 3-6	3- 2-6	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3 -3-0	3- 3-0
Basic bessemer	2-19-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3 -0-0	3- 0-0	3- 0-9	3- 1-0	3 -1-0	3- 1-0
Hematite*	555	555	562 50	562.50	565	565	565	565	565	565	575	575
SEMIFINISHED STEEL												
Billets	4- 7-6	4-11-9	4-13-9	4-11-6	4-14-6	4-16-6	4-14-9	4-16-9	4-18-0	5- 0-6	5- 1-0	5- 1-0
Wire rods	5-10-6	5-10-0	5-13-9	5-15-0	5-15-0	5-16-9	6- 0-0	6 -0-0	6- 1-3	6 -2-6	6- 2-6	6- 2-6
FINISHED STEEL												
Standard rails	6- 7-6	6 -7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6-10-0	6-10-0	6-10-0
Merchant bars	4-17-6	5- 3-9	5- 6-3	5- 4-6	5-11-9	5-15-0	5-13-9	5-17-6	6- 2-9	6- 3-9	6- 3-9	6- 2-6
Structural shapes	4- 7-3	4-12-9	4-14-9	4-13-0	4-15-6	4-17-6	4-16-9	4-17-6	4-19-6	5- 2-6	5- 2-0	5- 1-0
Plates, ship, bridge and tank	5-18-9	6- 1-9	6- 5-0	6- 4-0	6- 6-9	6- 7-9	6- 6-0	6- 7-3	6- 8-0	6- 7-6	6- 7-6	6- 6-6
Sheets, black, 24 gage	9-15-0	10- 5-6	10-12-6	10-10-0	10-12-3	10-14-0	10-11-6	10-15-0	10-16-3	10-11-3	10- 6-9	10- 3-9
Sheets, galvanized, 24 gage, corrugated	15- 0-0	15- 0-0	15- 0-0	15- 0-0	13- 5-0	13- 4-3	13-11-3	13-11-3	13-12-6	13-13-9	13-13-9	13-13-9
Bands and strips	5-18-0	6- 2-3	6- 2-0	6- 0-0	6- 6-6	6-15-3	6-13-6	6-16-9	7- 1-6	6- 5-3	6- 5-0	6- 5-0
Plain wire, base	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 5-0	7- 5-0	7- 7-6	7-10-0
Galvanized wire, base	8-17-6	8-17-6	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 2-6	9-10-0	9-15-0
Wire nails, base	7- 5-0	7- 5-0	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7-10-0	7-12-6	7-16-3	8- 0-0

*French francs.

Belgian Prices in Francs or Sterling Per Metric Ton

F.o.b. Antwerp

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, No. 3, Silicon 2.50-3.00	3- 2-0	3- 3-3	3- 4-0	3- 3-6	3- 2-6	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0	3- 3-0
Basic bessemer	2-19-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-0	3- 0-9	3- 1-0	3- 1-0	3- 1-0
SEMIFINISHED STEEL												
Billets	4- 7-6	4-11-9	4-13-9	4-11-6	4-14-6	4-16-6	4-14-9	4-16-9	4-18-0	5- 0-6	5- 1-0	5- 1-0
Wire rods	5-10-6	5-10-0	5-13-9	5-15-0	5-15-0	5-16-9	6- 0-0	6- 0-0	6- 1-3	6- 2-6	6- 2-6	6- 2-6
FINISHED STEEL												
Standard rails	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6- 7-6	6-10-0	6-10-0	6-10-0
Merchant bars	4-17-6	5- 3-9	5- 6-3	5- 4-6	5-11-9	5-15-0	5-13-9	5-17-6	6- 2-9	6- 3-9	6- 3-9	6- 2-6
Structural shapes	4- 7-3	4-12-9	4-14-9	4-13-0	4-15-6	4-18-0	4-16-9	4-17-6	4-19-6	5- 2-6	5- 2-0	5- 1-0
Plates, ship, bridge and tank	5-18-9	6- 1-9	6- 5-0	6- 4-0	6- 6-9	6- 6-0	6- 7-3	6- 8-0	6- 7-6	6- 7-6	6- 7-6	6- 6-6
Sheets, black, 24 gage	9-15-0	10- 5-6	10-12-6	10-10-0	10-12-3	10-14-0	10-11-6	10-15-0	10-16-3	10-11-3	10- 6-9	10- 3-9
Sheets, galvanized, 24 gage, corrugated	14-15-0	14-15-0	14-15-0	14- 9-0	13- 5-0	13- 4-3	13-11-3	13-11-3	13-12-6	13-13-9	13-13-9	13-13-9
Bands and strips	5-18-0	6- 2-3	6- 2-0	6- 0-0	6- 6-6	6-15-3	6-13-6	6-17-0	7- 1-6	6- 5-3	6- 5-0	6- 5-0
Plain wire, base	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 0-0	7- 5-0	7- 5-0	7- 7-6	7-10-0
Galvanized wire, base	8-17-6	8-17-6	9- 0-0	9- 0-0	9- 0-0	9- 0-0	9- 0-0	7- 0-0	9- 0-0	9- 2-6	9-10-0	9-15-0
Wire nails, base	7- 5-0	7- 5-0	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7- 7-6	7-10-0	7-12-6	7-16-3	8- 0-0

Recovery Slow in Great Britain

Business Generally Quiet—Production Receded but Imports Considerably Diminished—Exports Maintained—Prices Unsatisfactory—Tin Plate Industry Among Most Prosperous

By J. A. Horton
British Correspondent, Iron Trade Review

IN MANY ways 1928 did not realize the hopes held out for the British iron and steel industry. After a year of fluctuating conditions, traders are anxiously scanning the skies for a shaft of sunshine. Uppermost in the minds of many undoubtedly is the question of safeguarding, and a certain section of the trade is clamoring for a duty on iron and steel imports. It is believed in many quarters that the general election scheduled for the spring of 1929 will be fought on this issue. In his speech at the Yarmouth conference of the Conservative party in October, Stanley Baldwin, the British prime minister, stated that steps would be taken to simplify the formalities which now have to be gone through by an industry that wishes to take advantage of the safeguarding of industries act with the object of gaining protection. He further specified that every industry, including iron and steel, would have an equal chance of putting its case before a committee of inquiry. This has raised the hopes of those iron and steel producers who believe that a duty on foreign steel would considerably relieve the domestic trade. It should be noted, however, that opinion is not yet unanimous among iron and steel leaders, engineering firms and shipbuilding concerns. Furthermore, a searching inquiry would have to be made into the reaction on other trades of a duty covering iron and steel products, and the outcome of the safeguarding scheme from the standpoint of iron and steel still is uncertain.

Calm Year for Labor

The year was one of calm so far as labor is concerned, yet the effects of the disastrous upheaval of 1926 still were felt. At the end of October, however, all eyes were turned toward Germany, where a lockout affecting over 220,000 iron and steel workers had broken out. The British market is sensitive to continental movements, but reports exaggerated the reaction. Strictly speaking, the immediate effect was to stiffen all continental prices and close up certain sources of supply, but matters had been tending in this direction for several weeks previously. Arbitration was speedily resorted to.

If the statistics of overseas trade are any indication of the trend of business, it may be said that Britain already is on the straight and narrow road. Exports of iron and steel for the ten months ended Oct. 31, 1928, totaled 3,775,671 tons, compared with 3,657,007 tons in the same period of 1927. Still more encouraging to the home industries is the heavy fall in imports, from 3,912,130 tons in the ten months January to October, 1927, to 2,530,199 tons in the same period of 1928. Looking a little closer, some astonishing facts emerge in regard to pig iron imports. In the first ten months of 1927 Britain bought from abroad no less than 221,122 tons of foundry pig iron, whereas the 1928 total for the same period was only 35,336 tons. For basic pig iron the corresponding figures were 266,788 tons and 44,308 tons, respectively. Such is the evidence that continental pig iron now is out of the running with British consumers.

Unfortunately, that is only one side of the picture, for various other materials, particularly semifinished steel, have been imported in considerable quantities, not far short, in fact, of the 1927 totals, and it is on these imports that the advocates of safeguarding are taking their stand. An analysis of the exports in 1928 reveals a gradual strengthening of the position of British producers of pig iron, for 19,293 tons was shipped abroad in October, compared with 12,576 tons in January, and buyers of this material are to be found mainly among Britain's near neighbors on the Continent. The Tees exports of iron and steel for October reached the highest tonnage for any month in 1928.

Production in 1928 never reached the level attained the previous year, and only once did the steel output rise above the average of 1927. This was in March, which, strangely enough, has been the peak month for the past three years. In 1928 that month's output of steel was 793,300 tons, against 949,600 tons in 1927. Pig iron production through the year kept below the monthly average of 607,700 tons for 1927, the highest point touched being March, with 592,600 tons. At the end of October only 136 furnaces were in blast in England, Wales and Scotland, compared with 149 at the end of December, 1927. It must be remembered, however, that the capacity of the modern

British Business Progress in 1928

(Gross tons 000 omitted)

	PRODUCTION				IMPORTS			EXPORTS		
Monthly Ave.	Coal	Pig iron and ferro-alloys	No.* furnaces in blast	Steel ingots and castings	Iron ore	Pig iron and ferro-alloys	Steel†	Coke	Pig iron and ferro-alloys	Steel†
1913	23,951	855	338	639	603	18.0	168	.....	93.7	320
1925	20,618	520	141	616	365	23.8	203	102	46.7	264
1926	10,523	205	78	300	172	41.0	271	31	26.1	223
1927	21,339	608	149	758	430	51.1	316	67	27.6	322
1928										
Jan.	21,727	560	148	626	369	18.4	265	124	25.5	307
Feb.	20,926	551	148	764	404	14.5	272	117	30.2	287
March	22,706	593	150	793	431	19.7	252	83	47.9	361
April	18,490	563	149	644	359	9.9	243	78	31.8	313
May	18,378	592	148	753	379	10.0	227	72	45.1	314
June	19,167	564	141	709	441	7.5	203	115	39.3	327
July	18,387	538	131	667	317	5.3	214	147	32.3	301
Aug.	18,410	519	130	648	428	7.4	265	161	32.5	337
Sept.	19,580	504	131	719	272	10.2	174	177	35.9	259
Oct.	.....	544	136	756	331	6.2	255	203	43.4	334
Mo. Av.	19,752	553	136	708	373	10.9	237	128	36.4	314

*Average for 1913; on last day of year or month for subsequent figures.
†Includes iron castings, but scrap excluded.

furnace is many times greater than that of the old type. The steel position is similar. The explanation of short-time working at the plate mills is that the modern plant is built to handle enormous tonnage and can be maintained only by an equally large demand. But the work turned out in one week nowadays would probably have taken several weeks to produce before the war.

Unemployment Continues High

The unemployment problem is as serious today as it was a year ago, although improvement can be discerned here and there. The percentage unemployed in December, 1927, in iron and steel manufacture was 22.7 and by Sept. 24, 1928, dropped only to 20.9. In the pig iron industry on the same date the figure was 18.4, compared with 14.1 in December, 1927. The shipbuilding industry undoubtedly is far from being in a satisfactory condition, for unemployment there shows a substantial increase.

In comparing present unemployment figures for all trades with those of a few years ago, excepting 1926, it can be seen that the present-day tendency is toward an increase of unemployment. However, it should be stated that the total number of men employed today also is substantially larger than it was in the years preceding 1926. Consequently the large number of unemployed, which at the end of October was over 1,300,000, does not give quite a true picture of the percentage of unemployed in relation to the total number of workers, and therefore should not be taken as a measure of the lack of prosperity in British industry. There are a number of trades which have considerably developed in the past two or three years, two of which the automobile industry and the manufacture of electrical equipment, are closely related with iron and steel, and both of which employ a large number of workmen.

One of the trades which has enjoyed a good period, especially in the fall, has been the tin plate industry of South Wales. An output restriction scheme is in progress, which in effect means compulsory idleness at certain mills in a given period to insure a comparatively steady output from the whole trade. The wrought iron trade still is far from healthy.

So far as rolling stock is concerned, the year has been a fairly active one, and while the turnover has not been spectacular, shipments have been on increasing. Exports of locomotives for the ten months of 1928 show a total considerably ahead of the same period of 1927, but exports of railroad cars decreased. The British lines have exercised economy in a strict sense and British builders have booked most of their contracts with the colonies.

British Iron and Steel Exports

(Gross tons)

Principal commodities	(First nine months) 1928	1927	1926
Pig iron	280,985	180,136	263,552
Ferro alloys	39,360	42,592	27,482
Ingots	1,170	2,154	1,151
Semifinished steel, bars, shapes and wire rod	231,522	278,487	175,407
Special and tool steel	3,444	4,025	3,925
Bands, hoops and cold-rolled strip	45,062	36,515	40,097
Plates and sheets, black and galvanized	898,331	953,933	748,000
Tin, terne and coppered plates	404,191	364,124	310,836
Wire products	95,500	81,762	80,950
Wire nails, screws, nuts and bolts	38,952	38,258	40,207
Rails and track material	387,116	401,378	228,945
Tires, wheels, axles and other material	99,610	100,532	55,152
Constructional steelwork	59,298	87,852	40,117
Cast iron pipes and fittings	79,874	86,307	72,703
Other iron castings	18,933	17,394	20,984
Cables, chains and anchors	10,886	12,709	10,336
Forged tubes, bedsteads, hollow-ware	212,823	198,374	175,190
Hardware	119,101	117,579	132,502
Miscellaneous	218,576	177,570	173,543
TOTAL	3,224,834	3,181,681	2,601,079
Scrap	243,072	186,722	52,096
TOTAL, including scrap	3,487,906	3,368,403	2,653,175

Rebate Scheme Satisfactory

The rebate scheme in regard to the sale of British steel still is in force, and, to all outward appearances, it is working satisfactorily. Relief in the form of freight rate reductions came Dec. 1. This was made possible by the anticipation of a government scheme, the object of which is to afford relief to the railroads and to the productive industries in the form of de-rating. A large number of industries, particularly iron and steel, shipbuilding, etc., have to bear a heavy burden in the form of local rates; these rates will be substantially reduced with the aid of a government grant to the various counties. By anticipation, this de-rating scheme will be applied to the railroad companies on the condition that the resulting benefit will be passed on to coal, iron and steel industries. Later on, the de-rating system will be applied to these industries themselves. Thus there are good reasons to anticipate a reduction in the production costs of the heavy industries of Great Britain.

Finances Improved by Mergers

The financial position of many of the great steelmaking concerns of the country has improved. A year ago a dismal tale was told of heavy losses in trading, but recent meetings have proved the setback was temporary, and profits, though still of a modest character, are being registered by the leading companies. These results are largely due to drastic financial reorganization. Several prominent concerns whose activities extended from the making of pig iron to engineering and shipbuilding have amalgamated, forming a number of strong combinations. These mergers generally have been effected after a substantial reduction of capital and the writing off of considerable amounts. These concerns will have a reduced capital to remunerate and in some cases they have obtained a moratorium with regard to certain financial obligations; they now are in a much stronger position. The process of reorganization means that some works will be closed, and that the manufacture of certain products will be concentrated in those works which are most economically conditioned for that particular class of commodity.

Beyond a few minor fluctuations, the year has not seen any real movement in prices. In the last few months, however, an upward tendency developed in semifinished material, owing to the stronger position of British makers following the scarcity of continental supplies. Middlesbrough No. 3 pig iron was 1s higher than in January, 1927, whereas all other districts were obliged to concede several shillings. This naturally has led to competition on the northeast coast from Midland smelters. In the heavy steel industry, the association which controls the situation put up the price of plates and beams by 5s, and the rates then fixed have prevailed ever since. In the present conditions of trade, further advances are unlikely, and prices are barely remunerative. The makers of galvanized sheets, however, who have had a fairly good run of work all the year, were able to obtain another 10s over the January price.

German Production Lessened

Domestic Demand Restricted by Quieter Industrial Activities—Year Ends with Lockout Affecting 75 Per Cent Productive Capacity—Export Trade Increase Expected Coming Year

By Dr. E. H. Regensburger

German Correspondent, Iron Trade Review

GERMANY'S economic position in 1928, although fair, was not so satisfactory as in the preceding year. The domestic demand for iron and steel fell off, and the German iron and steel industry had to make up for reduced domestic sales by growing activity in export markets. Exports last year were about 12 per cent higher than in 1927. At the same time the output of the German iron and steel plants decreased. In October, 1928, only 70 per cent of the rolling mill output was sold in the home market, compared with 78 per cent for all 1927. The earnings of the producing concerns suffered from these conditions, because domestic prices were more profitable than export prices, which, until the latter part of the year, were below production costs.

Lockout Threatens Severe Loss

The end of the year was overshadowed by the labor conflict in the Rhenish-Westphalian iron and steel district, which, from the beginning of November resulted in a stoppage of about 75 per cent of German plants during several weeks. This will result in a severe loss to the industry. It has been calculated that the increase in wages of from 3 to 4 per cent provided for by the arbitrator's award, and which was rejected by the steelmasters, was equal to an increase of production costs of about 1 to 1¼ per cent, or to an increase of the payrolls in the iron and steel producing and consuming industries of 20,000,000 to 25,000,000 marks ($5,500,000) a year. Already in December, 1927, a stoppage was threatened, owing to an award of the arbitrator providing for higher wages. At that time the crisis was avoided, as the trend of business was upward and steelmasters expected soon to make up for the higher wages. At present, the situation is less favorable. As time went on last year, the rate of operation declined, while stocks in producers' yards accumulated. The decreasing activity of the German industry as a whole resulted in contraction of demand. Owing to these conditions, producers stated they could not endure heavier burdens, as profits from sales of finished products, domestic and foreign sales combined, in recent months averaged only 96.83 per cent of October, 1927, notwithstanding that both domestic and foreign prices were considerably higher. Costs of production have substantially grown, practically balancing the economies of rationalization. Wages in 1925 were advanced by almost 10 per cent, in 1926 by more than 6 per cent, and in 1927 by more than 12 per cent, so the proposed additional increase of from 3 to 4 per cent was claimed by the employers to be intolerable.

An illustration of the diminution of profits last year is given by the annual reports of two leading independent concerns, the Kloeckner and the Hoesch steelworks, which, after having increased dividends in 1927, decided to reduce them in 1928 from 7 to 6 per cent and from 8 to 6 per cent, respectively. The Harpen Coal Mine also registered a reduction. On the other hand, the Good Hope Co. decided to pay 7 per cent, against 6 per cent, and it may be safely assumed that the United Steel Works corporation, which produces about 50 per cent of the total German output, will again distribute a 6 per cent dividend on its share capital of $800,000,000 marks.

Notwithstanding the expansion of business, the development of rationalization has worked out in a further reduction of the number of workers employed by the company. On Sept. 30, 1928, there were 172,595 workmen, as against 193,179 a year previously, while the number of staff employes dropped from 15,740 to 15,394. Unfilled orders at the end of the fiscal year were 31.9 per cent smaller than a year previously, so the outlook for the coming months is less bright than a year ago.

While output of the United Steel Works corporation was satisfactorily maintained, figures for the whole of Germany show a falling off. In the first ten months of 1928 and 1927 the following tonnages were produced, respectively: Pig iron, 10,654,279 metric tons and 10,833,463 tons; steel ingots and castings, 13,057,821 tons and 13,537,226 tons; rolled products, 10,331,741 tons and 10,697,701 tons. Output of coal was 126,915,990 metric tons for 1928 and 127,494,709 tons for 1927, and furnace coke was 28,-

German Business Progress in 1928

(Metric tons 000 omitted)

Mo. Ave.	PRODUCTION* Coke	Pig iron and ferroalloys	†No. furnaces in blast	Steel ingots and castings	IMPORTS‡ Pig iron and ferroalloys	Steel§	EXPORTS‡ Coke	Pig iron and ferroalloys	Steel§
1913	2,532	910	.....	994	11	41	534	71	470
1925	2,234	848	83	1,016	17	104	315	19	277
1926	2,188	804	109	1,028	9	96	615	43	403
1927	2,688	1,092	116	1,359	24	218	733	30	848
1928									
Jan.	3,046	1,180	116	1,469	27	235	736	14	349
Feb.	2,897	1,222	115	1,323	23	217	748	22	369
March	3,006	1,170	113	1,422	19	229	711	26	408
April	2,713	1,045	107	1,161	27	219	724	20	393
May	2,738	1,044	104	1,248	27	160	625	18	380
June	2,746	1,021	103	1,295	31	146	643	21	433
July	2,938	1,035	100	1,311	30	153	833	24	443
Aug.	2,944	1,031	99	1,329	36	160	769	30	476
Sept.	2,867	985	99	1,190	26	150	786	30	450
Oct.	2,937	1,016	94	1,306	.....	.....	.....	.....	.....
Mo. Av.	2,883	1,075	94	1,305	27	185	731	23	411

*Figures for 1913 are for Germany in her present boundaries.
†On last day of year or month.
‡Figures for 1913 for prewar boundaries and include Luxemburg.
§Includes iron castings and scrap.

832,455 tons and 26,492,957 tons. Except lignite and coke, all materials were produced in smaller quantities than in 1927; estimates for the whole year are still more reduced, owing to the lockout in the Rhenish-Westphalian district. For 1928 the estimated output was about 11,500,000 metric tons of pig iron, against 13,103,000 tons in 1927; 14,000,000 tons of raw steel, as against 16,310,000 tons and 11,500,000 tons of rolled products, as against 12,839,000 tons. One effect of the decline in output was a reduction of the penalty for excess production which Germany had to pay into the common fund of the European steel entente. In the last quarter of 1928, and for the first time since the formation of the entente, it is expected that Germany will receive more from the fund than she has to pay into it. Germany's disbursements for the first quarter were 2,578,000 marks ($615,000), and for the second quarter 1,651,000 marks ($395,000), representing 0.64 marks ($0.16) and 0.47 marks ($0.11) per ton produced, respectively. A year previously, before the penalties had been reduced, the penalty rates per ton were 2.82 marks ($0.67) and 1.11 marks ($0.26). Furthermore, and in order to enable the German producers to increase export sales in the event of domestic business decreasing, their monthly export quota was raised last year by the steel entente from 225,000 metric tons in the first quarter to 275,000 tons in the second and to 300,000 tons per quarter from July 1. The influence of the steel entente on the markets during the whole year was weakened by the fact that the establishment of international selling associations for the various products did not materialize.

German Iron and Steel Exports

(Metric tons)

Principal commodities	(First nine months)* 1928	1927	1926
Pig iron	174,697	267,320	299,563
Ferroalloys	30,076	31,535	37,166
Ingots and semifinished steel	417,419	265,627	302,679
Bars, shapes, hoops and bands	914,467	692,882	860,122
Plates and sheets, black and galvanized	315,993	412,732	401,443
Tinplates	26,099	21,647	12,295
Wire rod and wire products	405,499	398,819	421,584
Wire nails, screws, nuts and bolts	77,560	65,811	72,740
Rails and track material	429,944	283,627	376,411
Tires, wheels and axles	48,436	47,138	40,390
Constructional steelwork	35,381	48,358	30,541
Forgings and malleable castings	152,172	162,046	125,763
Cast iron pipe	67,824	61,296	56,724
Other iron castings, except malleable	112,901	100,638	83,389
Anchors, anvils, hammers, blocks, etc.	5,706	4,994	5,138
Forged tubes	260,691	216,533	224,878
Boilers, reservoirs, etc.	55,308	48,540	41,874
Hardware	30,549	30,125	28,733
TOTAL, including items not specified	3,719,038	3,298,456	3,562,572
Scrap and turnings	186,655	190,545	326,056
TOTAL, including scrap	3,905,693	3,489,001	3,888,628

*1927 and 1928 include reparations deliveries.

Iron and steel exports of Germany increased from 3,489,278 metric tons in the first nine months of 1927 to 3,905,693 tons in the corresponding period of 1928. From 363,000 metric tons in January, the low point of the year, exports advanced up to March, but then declined until May. Since that time a continuous improvement, temporarily hampered by the Antwerp strike, up to 506,000 metric tons in August was registered, while in the latter months foreign sales were handicapped by the lockout in the Ruhr district. The advance of world market prices first reduced the loss that German exporters suffered when selling abroad, until at the end of third quarter export prices reached a level above German production costs. The cost of production of merchant bars, for instance, is estimated at about 123 marks ($29.40) per metric ton; the export price was 96 marks ($22.85) in January and 126 marks ($30) in November. During the greater part of the year, export business was lively, and several times, as in August and September, the German producers were even obliged to discontinue their export sales in order not to exceed the export quota allotted by the steel entente. Almost all commodities were exported in larger quantities than in 1927. Decreased exports were registered with regard to only a few commodities, the most important being plates. German exports next year are expected to increase. Domestic consumption tends to decline, while on the other hand, the increasing reparation payments will induce Germany to expand her foreign sales.

Imports of iron and steel in 1928 remained almost on the same level as in 1927. In the first nine months they aggregated 1,907,642 metric tons, against 2,070,359 tons in the corresponding period in 1927. Since October, 1927, when imports reached 299,000 metric tons, figures declined almost without interruption, being 262,000 tons in January, 1928, and 176,500 tons in September. The decrease affected most commodities; merchant bars and structural shapes, sheets and cold-rolled wire were among the exceptions. Owing to these facts, Germany's export surplus recovered part of the loss suffered in 1927 and aggregated 1,998,000 metric tons in the first nine months of 1928, against 1,419,000 tons in the corresponding period of 1927. This development, however, resulted to a great extent from the decrease of German domestic consumption caused by the slow decline of business during the second part of the year. Previous to the two advances of domestic quotations which occurred in January and May, and by which the prices for merchant bars were raised from 134 to 141 marks per metric ton, demand from home consumers revived, as it did prior to the increase in railway rates on Oct. 1; but on the whole, home consumption was not satisfactory. In the third quarter the volume of unfilled orders declined by about 25 per cent. Activities of the building trade became restricted through lack of fresh capital, the railroads could buy rails and sleepers only at a rate of 40,000 tons a year, or half their usual rate, the machinery industry operated at 75 per cent of capacity, and other iron-consuming industries reported a similar state of affairs.

Germany Buys Foreign Pig Iron

With regard to pig iron, Germany, from an exporting country became an importer, on account of the growing imports of Alsace-Lorraine iron in her own market, while at the same time exports to the United Kingdom were reduced from 74,880 metric tons in the first nine months of 1927 to almost nil. England also was a strong competitor in foreign markets, with the result that German pig iron exports fell from 267,300 metric tons in the period January to September, 1927, to 174,700 tons in the corresponding period of 1928, or to 1.8 per cent of the output. Imports of pig iron, on the other hand, advanced from 186,800 metric tons to 237,200 metric tons. Production of pig iron gradually decreased and a growing number of blast furnaces was idle; on Oct. 31, 1928, only 94 stacks were in operation, compared with 114

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French Metallurgy Prosperous

Year of Record Output—Prices Justify Expectation of Satisfactory Financial Results—Trade Benefits by Domestic and International Agreements—Ore and Coke Production Stimulated

By J. M. Leon

French Correspondent, Iron Trade Review

BECAUSE most French citizens at the April elections put reason before party politics, 1928 has been for France a year of splendid recovery. The first important act of the new parliament was to legalize the value of the franc. As the rate of stabilization was practically that maintained throughout 1927, the equilibrium of trade and industry was not disturbed, and activities proceeded in an atmosphere of new confidence. Even during the period preceding the elections, their result was discounted and there was no substantial recession in domestic business. Although exports of French iron and steel in 1928 did not reach the tonnage of the previous year, it is to be noted that in general imports of coal decreased while exports of raw materials and manufactured goods in all classes increased. This factor, coupled with the fact that domestic business was active, indicates progress of the country's productivity.

Pig Iron Production Higher

More particularly with regard to the iron and steel industries the average monthly production of pig iron during the first nine months of 1928 was well ahead not only of the average output in 1927, but even of that of 1926, when iron and steel activities had been stimulated by the depreciation of the franc. During the nine months under review, the average monthly output of pig iron in 1928 was about 850,000 metric tons, as against 775,000 tons in 1927 and 786,000 tons in 1926. Last year's figure is a record, which shows that French steelmasters have taken full advantage of the considerable plant and modern equipment at their disposal. With regard to steel, the average monthly output during the first nine months of the year was about 750,000 metric tons, against 675,000 tons for 1927 and 690,000 tons for 1926. This was composed of about 70 per cent of basic bessemer steel, 27 per cent of open-hearth steel, and 3 per cent of acid bessemer steel, electric steel and crucible steel. The Lorraine district remains the largest center of production both for basic bessemer steel and for open-hearth steel, but the northern district tends to regain the considerable position that it held before the war with regard to the production of high-grade steels, and some works in that district are particularly well located for export trade in view of their proximity to the port of Dunkirk.

The output of finished products can only be estimated, but it can be assumed that the monthly average production for 1928 was about 600,000 metric tons, of which about one-third was merchant bars. However, it can be said that all classes of steel products have seen their production increased. Special mention should be made of wire rods, production of which has exceeded that of 1926 by about 20 per cent. Part of this material is employed for concrete work, but most is transformed into wire products. The situation of wire product manufacturers improved considerably; they have overcome the crisis of 1926 and 1927, and, in fact, a large number of mills are operating to capacity and have withdrawn from the market. The automobile industry has been active and now occupies third rank in the world for the number of automobiles produced. The turnover of that industry has increased from 1920 to 1928 in the proportion of about one to five.

This considerable increase of production in France was accompanied by a substantial buying movement on the part of jobbers and manufacturers, and prices have risen in consequence. During the last quarter of 1927 it was noted that the iron and steel market was becoming firmer. Gradually, orders coming from the domestic market attained such a volume that order books were constantly filled and deliveries were extended first to two and then to three months. Periods of delivery have continued to extend until at the end of last year semifinished steel, merchant bars, shapes, wire rod and wire products could be delivered only three, four, and even five months after the order was taken. In October and November, 1927, the price of 2-inch billets ranged from 490 to 500 francs ($19.10 to $19.50) per metric ton. In January, 1927, it became evident that the comptoir of A-products would be formed, and this determined buyers to cover themselves, as they feared higher prices. The comptoir was formed in February and fixed the base price of billets at 555 francs ($22.40), Thionville parity, for basic bessemer steel. This price was main-

French Business Progress in 1928

(Metric tons 000 omitted)

	PRODUCTION					IMPORTS			EXPORTS	
Monthly Ave.	Iron ore	Coke*	Pig iron and ferro-alloys	No. furnaces in blast†	Steel ingots and castings	Coke	Pig iron and ferro-alloys	Steel‡	Pig iron and ferro-alloys	Steel‡
1913	1,826	336	434	131	391	256	4.2	10	9	43
1925	2,943	255	708	148	621	417	4.3	12	59	272
1926	3,269	314	786	155	702	463	4.1	12	59	265
1927	3,723	339	775	142	690	396	5.6	6.5	70	363
1928										
Jan.	4,122	357	809	144	753	473	3.1	3.7	58	328
Feb.	3,890	343	785	149	738	411	6.7	7.5	50	415
March	4,209	369	858	149	804	446	11.2	8.9	58	377
April	3,699	360	834	150	738	483	4.6	10.3	47	320
May	3,973	368	871	150	794	527	5.4	10.8	49	319
June	4,201	360	844	148	797	489	3.4	13.1	41	323
July	4,081	370	836	148	757	427	3.4	9.9	53	260
Aug.	4,282	364	858	150	793	445	2.9	8.9	56	376
Sept.	4,093	354	821	149	759	425	3.8	14.1	62	340
Oct.	.....	.....	857	150	834	.....	.....	.....	....	.....
Mo. Av.	4,061	361	837	150	777	458	4.9	9.7	53	340

*Coke production at the coal mines; in addition the iron and steelworks produce approximately 3,500,000 tons annually.
†On last day of year, or month.
‡Includes ingots, semifinished steel, all rolled products, forgings and scrap.

tained until September, when it was raised to 590 francs ($23). Merchant bars, which constitute a free market, were sold at about 580 francs ($22.50) at the beginning of January and at the end of the year they were quoted at 720 to 760 francs ($28 and $29.50). The price of wire rod also progressed, and the price of wire nails advanced from 1000 francs ($39) to 1200 francs ($46.75). Export prices increased correspondingly and merchant bars, which were quoted at £4 16s 6d ($23.40) f.o.b. Antwerp at the beginning of the year, were sold at as high as £6 5s ($30.25) at the end. In general, the increase of prices by the end of 1928 was about from 20 to 30 per cent.

Production Control Exercised

These results are largely due to the control to which continental iron and steel makers have submitted themselves with respect to steel production. Industrialists in France and in the neighboring countries also have adhered to a number of agreements with regard to the sales of their products in their respective countries, and this goes some way in removing barriers between continental nations owing to the complicated tariff system. The European steel entente has functioned satisfactorily throughout 1928. The production quota allotted to the member countries, which is fixed at each quarterly meeting, remained based on an annual figure of 29,287,000 metric tons for France, Germany, Belgium, Luxemburg, and the Saar. For the first three quarters of the year France exceeded her quota of 6,778,800 tons by 136,663 tons.

The steel entente has been a stepping-stone to the formation of agreements covering certain classes of steel products. The international wire rod syndicate was formed in November, 1927, and has given satisfactory results. Under this agreement the output of wire rod in France for 1928 was increased, and at the same time prices were remunerative both in the domestic market and in export markets. Originally the wire rod syndicate was formed subject to the establishment of an international entente between manufacturers of wire products of France, Belgium, Luxemburg, the Saar, and Germany, and under the circumstances the duration of the wire rod syndicate was provisionally fixed for one year. Although the wire products agreement has not yet materialized, the wire rod syndicate has given so much satisfaction that it has been decided to extend its life until June, 1929, when it is hoped that an agreement concerning wire products will be reached. The European rail-

French Iron and Steel Exports

(Metric tons)

Principal commodities	(First nine months) 1928	1927	1926
Pig iron	467,205	652,594	500,509
Ferroalloys	7,094	5,119	3,336
Ingots	43,587	42,270	24,437
Semifinished steel, bars and shapes	1,875,907	2,165,954	1,517,706
Special and tool steel	1,634	1,217	1,146
Wire rod	183,043	135,348	79,930
Bands, hoops and cold rolled strip	90,784	69,294	29,184
Plates and sheets, black and galvanized	182,007	218,723	160,305
Flats	10,918	7,905	6,261
Tin, terne and coppered plates	16,976	23,264	14,393
Wire products	49,262	40,484	30,405
Wire nails, screws, nuts and bolts	40,825	38,748	31,778
Rails and track material	301,492	312,324	267,471
Tires, wheels and axles	14,970	15,495	14,106
Constructional steelwork	177,690	195,171	142,286
Cast iron pipe, columns, etc.	206,961	255,825	199,433
Other iron castings	13,127	13,903	13,979
Cables, chains, anchors and barbed wire	18,122	15,238	8,734
Forged tubes, boilers, reservoirs	68,792	63,800	49,003
Hardware	26,951	27,506	31,869
TOTAL	3,797,347	4,300,182	3,126,271
Scrap and turnings	288,416	292,704	131,510
TOTAL, including scrap	4,085,763	4,592,886	3,257,781

makers' association, known as the ERMA, also has been active, although there has been a setback in the volume of inquiries for rails from consuming countries.

Comptoir Benefits Trade

While France is a party to these various international organizations, a national syndicate or comptoir came into existence in February, 1928, which regulates the sales of semifinished steel and structural steel in the domestic market. This comptoir is known as the comptoir of A-products. It is generally recognized that the trade has profited by the organization of this syndicate, which centralizes the orders for the products that come under its jurisdiction and fixes prices. Satisfaction is expressed that the prices fixed were profitable, while, on the other hand, they were kept within bounds. The activities of rolling mills have been such that toward the end of the year the comptoir found it difficult to meet requirements of consumers of semfinished steel. When negotiations again are started with other countries for organization of an international selling syndicate for this class of products, the existence of a syndicate in France will facilitate negotiations. The pig iron organization continues, and there also exists in France a syndicate of tin plate manufacturers, and one which comprises the manufacturers of shoe nails. Both these syndicates were formed in 1928. In addition, negotiations are being conducted for the formation of a comptoir for plates and sheets, hoops, and skelp. Up to now the object of the existing comptoirs has been fulfilled, i. e., to regulate prices and maintain them at a profitable level, but without exceeding the limits where they would discourage the buyer.

Industry Has Organized

These developments tend to show that during the past year the French iron and steel industry has taken considerable steps in the direction of organization by co-operation, and this has assisted iron and steel makers to utilize to good effect their means of production, and to increase their output. This now compels them to face the problem of marketing their products, for it should be noted that the capacity of production in France is considerably above the capacity of absorption of the domestic market, and it can be assumed that France must export about 50 per cent of her production of steel. It has been computed that the consumption of steel per capita in France is only about 150 kilograms, as against about 250 kilograms in neighboring countries. Leading personalities of the Comite des Forges have realized that it should be possible to increase domestic consumption, and it is planned to collectively advertise the various uses of steel in the country. The whole scheme of propaganda is being prepared to educate the French people in the use of steel in every direction where it can possibly be used.

Notwithstanding the development of the French iron and steel industries in 1928 and the prosperous trend of the iron and steel trade, there still are difficulties and certain charges which the heavy industries have to bear. One problem special to the French market is the necessity of absorbing a certain tonnage of German products as deliveries in kind on reparations account. During the past year the French in-

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Year of Progress For Belgium

Expansion of Demand from Foreign Consumers—Output Exceeds All Previous Records—Wages and Railroad Rates Increased—Crisis Continues in Coal Industry—Future Prospects Good

European Staff Special

FOLLOWING a year of high production, but of unsatisfactory prices, 1928 has been for the Belgian iron and steel industries a year of record output and profitable trade. The Belgian domestic market can absorb only about 20 per cent of the country's output, and efforts were specially concentrated on export business. Quieter political conditions in China were accompanied by a greater volume of inquiries from that market, while business with South America, India and Japan was active. In these outside markets Belgium was not alone, as France and, to some extent, Germany were competing, but in the case of Germany competition was not so acute, as that country's domestic market was active during the greater part of the year.

The output of pig iron and steel in Belgium during 1928 was substantially in excess of that of 1927. During the first three quarters Belgium's steel quota, as fixed by the steel entente, was 2,602,855 metric tons, but the actual tonnage produced was 2,920,482 tons, an excess of 317,627 tons, on which Belgium has to pay the penalty. Undoubtedly Belgium, as well as Germany and France, could have produced even more than it did if the operation of the steel entente had not served to control production, thus preventing the demand being exceeded and maintaining a fair level of prices. In October last year, the highest figures on record were reached for the output of pig iron, raw steel and rolled steel products.

Price Level Satisfactory

The prices quoted at the Brussels iron and steel exchange showed a considerable increase compared with those of the previous year. There were, however, some fluctuations, depending upon the extent to which France and Germany were competing on export markets. These two countries are more or less aggressive according to the state of their domestic markets, and prices tend to rise or fall in accordance with the state of competition. It is to be noted, however, that at the end of the year merchant bars were quoted at £6 2s 6d to £6 5s ($29.70 and $30.25) f.o.b. Antwerp, as against £4 17s ($23.50) at the beginning. Similar increases were registered for semi-finished steel, plates, etc., and prices generally at the end of the year were 20 to 30 per cent higher than in January; in fact, prices had reached such a level that the British were sometimes in a position to compete on the continent for pig iron, ship-plates, sheets, and even open-hearth semifinished steel.

Although prices during 1928 were profitable to Belgian industries, the cost of living also increased and caused workmen to put in a request for higher wages. These demands have been met to some extent by the employers. There was, however, a serious strike of dockers at the port of Antwerp, which lasted several weeks. This strike, which was supported by Bolshevist propaganda, caused a certain amount of inconvenience to Belgian iron and steel industries, but without bringing about a serious drop in production, as many merchants accumulated stocks while export business continued through the ports of Rotterdam and Dunkirk. During 1928 also the Belgian railroads increased their tariff by 10 per cent for the transport of coke and 5 per cent for iron ore.

Taken as a whole, the Belgian iron and steel works have enjoyed a prosperous year. It is true that while prices were advancing, production costs also were increasing, owing to higher wages and higher freight rates. While a satisfactory price level was maintained, due in great part to the activities of the various international ententes, Belgian iron and steel makers endeavored to reduce production costs by rationalization. The process of amalgamation of large works has been going on for the past two or three years. The principal groups at the end of 1928 were: Cockerill, Ougree-Marihaye, Angleur-Athus, Esperance Longdoz, La Providence, Sambre-et-Moselle, Clabecq, Gustave Boel, and Usines Metallurgiques du Hainaut. These nine groups together operate 57 blast furnace stacks. In addition to production of pig iron, these various groups include steel plants, rolling mills and wire mills. In the Cockerill group is included the Usines a Tubes de la Meuse, a pipe-manufacturing plant. In addition to the above mentioned groups, the Laminoirs de Jemappes and the Tubes de Jemappes amalgamated, while the Arbed group,

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Belgian and Luxemburg Business Progress in 1928

(Metric tons 000 omitted)

	PRODUCTION					BELGIUM AND LUXEMBURG IMPORTS		BELGIUM AND LUXEMBURG EXPORTS	
		BELGIUM		LUXEMBURG					
Monthly Ave.	Coke*	Pig iron and ferro-alloys	Steel ingots and castings	Pig iron and ferro-alloys	Steel ingots and castings	Pig iron	Steel‡	Pig iron	Steel‡
1913	294	207	206	212	111	48†	26†	1.4†	130†
1925	343	212	212	197	174	27	18	8.0	242
1926	413	283	281	209	187	28	27	13.1	304
1927	449	313	309	226	206	32	28	11.3	387
1928									
Jan.	489	315	316	230	213	38	35	6.7	293
Feb.	455	302	310	220	205	40	38	7.9	406
March	495	327	326	240	220	44	32	11.9	465
April	481	313	305	227	203	37	30	9.6	329
May	506	329	325	234	215	36	33	15.3	342
June	489	321	329	230	215	44	34	7.5	387
July	501	324	320	225	208	42	37	7.4	350
Aug.	505	329	342	234	224	46	40	7.7	299
Sept.	492	325	331	231	209	....	....	.....	.....
Oct.	498	344	356	236	229	....	....	.....	.....
Mo. Av.	491	323	326	231	214	41	35	9.2	359

*Production at the coal mines. †Belgium only ‡Includes iron castings and scrap.

Italy Surmounting Its Crisis

Conditions Gradually Improve During Second Half of Year—Hydro-Electric Developments Continue on Large Scale—Rolling Mill Capacity Exceeds Country's Requirements

By Guido Vanzetti
Special Correspondent

DURING the first half of 1928 the Italian iron and steel industries continued to suffer from the economic depression which prevailed during the preceding year. From the end of the summer, signs of amelioration began to appear, and as the year drew to a close the situation gradually strengthened. Since the coming into power of the present government at the end of 1922, the trend of activities of the Italian industries was subject to considerable fluctuations. In 1925 the output of steel reached its maximum, at the end of that year being nearly twice the output of 1913. In 1926 conditions continued satisfactory during first half, owing to development of such industries as electrical undertakings, automobile manufacture, mechanical engineering, and building schemes, but dating from the revaluation of the Italian currency, a considerable setback in industrial activities took place.

During the whole of 1927 and the greater part of last year, efforts of Italian industrial leaders were principally directed to reorganizing and co-ordinating their works. They also acted in co-operation to improve methods of marketing their products. Toward the end of the year these efforts resulted in a substantial increase in output of pig iron and steel. This period of active production was accompanied by a decrease in iron and steel imports, i. e. in actual imports, because a substantial tonnage enters Italian territory which is transformed and re-exported.

Ore Extraction Developing

Italian iron ore mines yield a considerable tonnage of material, and even in the mines of the Isle of Elba, which at one time were said to have become unproductive, new sources of supply have been discovered. In recent years the mines of Cogne have been brought up to a point where they now are commercially productive, and yield magnetite of exceptional purity. Another source of supply of ores which continues to develop is from concentrates from sulphuric acid plants. The output of these concentrates now averages about 300,000 metric tons a year. There also are in the Mediterranean basin mines from which ore well adapted to Italian furnaces can be extracted. One of the most important raw materials in the Italian iron and steel industry is scrap, and there have been some difficulties owing to shortage of this material.

During 1928 there has been a continual development of hydroelectric installations, and the manufacture of electric steel has followed a parallel course and eventually will become one of the principal industries of the country. At the end of 1928 about 50 large hydroelectric power stations were under construction, which will increase power by 1,600,000 kilowatts and will correspondingly increase the present output, which is on an average of 5,000,000,000 kilowatt-hours. At the present time, however, the greater proportion of the steel made in Italy is made in the open-hearth furnace and only a small percentage is manufactured in electric furnaces. On the other hand, electric furnaces are extensively used for the manufacture of steel castings. In quite another direction investigations are being made as to the possibilities of a process for the direct manufacture of steel.

As in many other countries, exceptional demand for iron and steel caused by the war has resulted in considerable development of iron and steel plants. In Italy this development has been particularly marked in the erection of rolling mills, and it can be said that the capacity for rolling steel in Italy is greatly in excess of steel-producing capacity. Although the Italian steel industry is protected by a high tariff, it is expected that eventually those works which cannot operate economically will close.

National Syndicates Encouraged

An organization exists which handles the sales of iron and steel products in both domestic and foreign markets. It is proposed to encourage and develop such organizations and to group the works with the object of purchasing necessary raw materials, particularly steel scrap. It also is intended to take all possible steps to reserve the domestic market to the national industries. One factor in favor of national production is that Italy is rich in labor, which in recent years has become disciplined and which is content with comparatively low wages.

Taking a general view of the iron and steel industries of Italy, it can be seen that the possibilities of export business are greatly restricted, while the domestic market also is limited. The elongated shape of the country also necessitates transportation along considerable distances. It is owing to these difficulties that little further expansion can be expected; in fact, it has been stated that certain works may have to be dismantled or used for other purposes. Italy's progress is more in the direction of quality than of quantity.

Toward the end of the year, large orders were received, following the decision of the government to spend considerable sums on public works, electrification, and the building of railroads. There also was an increase in demand from shipyards and other industrial concerns. During 1928 iron and steel prices in Italy remained fairly stable, and at the end of the year 4-millimeter black sheets were quoted at 1100 lira ($58) per metric ton, the same as at the end of 1927. Whereas Italy does not export more than about 10,000 metric tons of iron and steel annually, considerable business is done with foreign countries through sales of electrical equipment and automobiles.

Italian Production

(Metric tons)

	Iron ore	Coke	Pig iron	Steel ingots and castings
1913	603,115	498,440	426,755	933,500
1918	694,675	371,405	313,575	992,530
1919	613,095	302,735	239,710	731,825
1920	389,965	95,725	88,070	773,760
1921	285,460	34,020	61,380	700,435
1922	314,410	167,955	157,600	982,520
1923	360,100	275,235	236,255	1,141,760
1924	237,670	309,970	303,970	1,358,855
1925	513,250	512,265	481,800	1,785,530
1926	522,785	591,530	513,425	1,779,159
1927	425,300	.....	494,705	1,594,527
1928*	.....	.....	500,000	2,000,000

*Estimated.

Trade Active in Eastern Europe

Output Increases Generally—Domestic Markets of Each Country Protected by Reciprocal Agreements—Exports Fairly Maintained—Russia Plans Ambitious Production Program

By Prof. Dr. Mont. Frant. Pisek
Special Correspondent

SATISFACTORY conditions have prevailed in eastern European industrial countries during 1928. In Czecho-Slovakia the economic situation generally has improved. Unemployment figures were small. Sufficient capital was available for the development of trade. The stabilization of the political situation also played an important part in business conditions. During the year 12 blast furnace stacks were active, with a monthly production of more than 120,000 metric tons of pig iron. Steelworks produced an average of 150,000 metric tons of raw steel per month. Actual figures of production for the first ten months were 1,285,000 metric tons of pig iron and 1,435,000 tons of raw steel. It is estimated the general increase of production over that of 1927 is 17 per cent, and that this increase is mostly due to the activities of the domestic market. During the first three months the tonnage of pig iron ordered was 28 per cent in excess of that for the first quarter of 1927, and in the second quarter of 1928 the volume of orders was 47 per cent higher than in the corresponding period of 1927. Similar increases were registered in sales of rolled products.

Exports of iron and steel have been practically on the same level as in 1927, averaging about 40,000 metric tons per month. The principal destinations were eastern and southern Europe. From western Europe the demand is limited to special products. It is believed the financial results of the various companies will be satisfactory, but only slight increases in dividends are expected, owing to the high rates of taxation, increased social charges, and the necessity of consolidating the financial position of the various concerns.

Domestic prices during 1928 were stable and practically on the same level as in 1927. All the important Czecho-Slovak works are members of a sales organization which was formed in 1921 and which receives orders, distributes them among the works and invoices them to the buyers. This organization also is gradually taking up export business. Up to June, 1928, Czecho-Slovakia, Austria and Hungary had formed the central European steel entente, which was represented as a group in the international steel entente. About the middle of last year this central European entente was broken up and each member country became an independent member of the European steel entente, each having its respective quota. Czecho-Slovakia enjoys the advantage of having no restriction with regard to its domestic market, but it has an export quota of 432,836 metric tons.

Production in Eastern Europe

(Metric tons)

Pig Iron

	1913	1927	1928*
Russia	4,635,000	2,900,000	3,250,000
Czechia	1,200,000	1,260,750	1,540,000
Poland	1,040,000	617,435	700,000
Austria	605,000	435,000	455,000
Hungary	190,000	299,330	280,000
Rumania	.....	63,500	64,000
Yugo-Slavia	.....	15,000*	15,000

Raw Steel

	1913	1927	1928*
Russia	4,435,000	3,500,000	4,100,000
Czechia	1,450,000	1,875,000	1,800,000
Poland	1,590,000	1,255,000	1,400,000
Austria	890,000	551,000	630,000
Hungary	440,000	471,680	480,000
Rumania	.....	116,700	150,000
Yugo-Slavia	.....	30,000*	30,000

*Estimated.

The Czecho-Slovak steelworks have signed with the principal neighboring countries, agreements covering the reciprocal protection of their respective territories. The outlook is favorable.

Conditions in the Polish iron and steel industry also have been satisfactory, and the output of steel has been on a level with prewar figures. During the first eight months the output of pig iron was 447,600 metric tons and the output of raw steel 911,200 tons. It is expected that iron and steel production during the whole of 1928 will be about 9 per cent higher than in the year 1927, as the works had more occupation last year than in the previous year and employed a larger number of workers. The number of men employed in the Polish iron and steel works at the end of last year was between 65,000 and 66,000. The prospects of the Polish industry are favorable, and the agreements signed with the Austrian, Hungarian and Czecho-Slovak steelworks protecting the Polish domestic market will probably be renewed.

The Austrian iron and steel industry is principally represented by the Alpine Montangesellschaft of Vienna. The occupation of the works has been satisfactory, and it was stated that during second quarter of the year the volume of orders was the highest since the end of the war. Throughout 1928 three blast furnace stacks were active, and production of pig iron was about 455,000 metric tons, against 435,000 tons in 1927, while output of steel was about 630,000 tons, compared with 551,000 tons in the preceding year, showing an increase of about 4.6 per cent for pig iron and 14.5 for steel. In July the Alpine concern became an independent member of the European steel entente. At the end of first half blast furnace works were operating at 61.48 per cent of capacity and steelworks at 89.54 per cent. The outlook for the future is hopeful.

In Hungary four to five blast furnaces were active during the year. Although the occupation of the works was about 85 per cent of capacity, iron and steel production was slightly less in 1928 than in 1927. In Rumania the output of pig iron was about 64,000 metric tons, about the same as in 1927, but the output of raw steel was about 150,000 tons, compared with 116,000 tons in 1927. In Yugo-Slavia the output was practically on the same level as the year before. In the latter country there are two principal iron and steel works, and it is planned to amalgamate these.

Reports from Russia indicate that throughout 1928 about 65 blast furnaces were active. In the first half of last year the production of pig iron amounted to 1,684,000 metric tons and that of raw steel was 2,109,000 tons. Since 1922 production has been increasing and, according to soviet plans, next year's increase should be about 23 per cent over 1928.

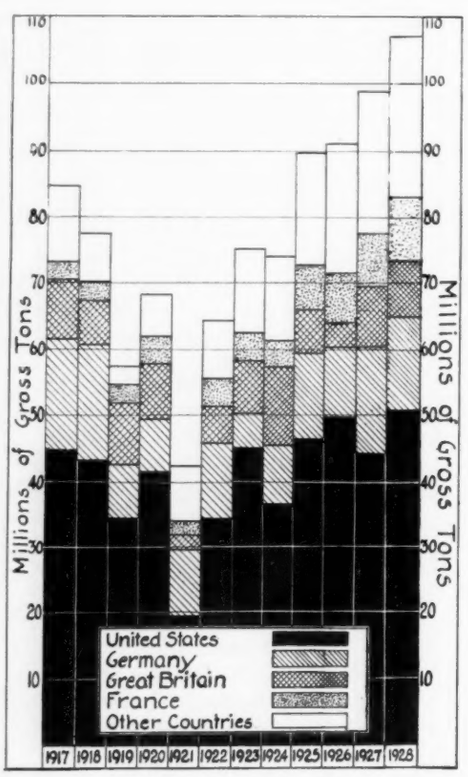
World Tonnage Rises Once More

Nearly All Countries Increase Their Output—America Leads—Germany's Loss Reduces Europe's Total—Steel Progresses More Rapidly Than Pig Iron—American Exports Best Since 1920

FOR the sixth year in succession the world steel output in 1928 exceeded all previous figures. Pig iron production also attained a record tonnage, although to a less degree than steel. The United States was mainly responsible for the increase in steel production, Europe's record having been lowered by a setback in Great Britain and, even more so, in Germany. Stocks in the hands of users and in warehouses were probably greater at the close of 1928 than at the end of 1927, but undoubtedly world consumption was on a greater scale last year than at any previous time. According to statistics compiled by IRON TRADE REVIEW through the aid of its far-reaching editorial organization, and shown in the accompanying tables, 86,130,000 gross tons of pig iron and 107,210,000 gross tons of steel ingots and castings were produced in the world during 1928. This compares with 85,195,000 tons of pig iron and 100,408,000 tons of steel in 1927, 77,573,000 tons of pig iron and 91,898,000 tons of steel in 1926, and 77,714,000 tons of pig iron and 74,687,000 tons of steel in 1913.

The world's steel output in 1928 was 6.5 per cent greater than in 1927, and 43 per cent in excess of the last prewar year, 1913. The increase of the United States' output of steel last year was 13.7 per cent over the previous year's tonnage and practically corresponded to the world's increase of roughly 6,500,000 tons. The European situation is interesting inasmuch as, with the exception of Great Britain and Germany, almost every other producing nation saw its output substantially increased. Great Britain's loss was about 600,000 tons, or about only 1.16 per cent of Europe's total, but Germany's drop was about 2,000,000 tons, or 3.9 per cent of Europe's total. While Great Britain's reduced output was due to static conditions, the German loss was accidental, and it can be assumed that without the Ruhr lockout, Germany would have been about only 500,000 tons behind the 1927 tonnage. The steel production of Europe last year was about 51,675,000 tons, or slightly more than in the preceding year when 51,658,000 tons were produced. Had German plants been able to operate evenly up to the end of the year, Europe's contribution to the world output would have been 53,000,000 tons, or nearly 50 per cent of the total. Under the prevailing circumstances, the United States was responsible for 52 per cent of world production.

Throughout the year the European steel entente maintained the quota of the five principal member-countries—Germany, France, Belgium, Luxemburg and the Saar—at 29,287,000 metric tons or 28,818,408 gross tons. The actual output of the five interested countries aggregated 31,615,000 tons, or an excess of 2,796,592 tons, on which the penalty for overproduction has to be paid. For the first time, last year each member-country exceeded its quota, but Germany most of all, notwithstanding the fact that for the last quarter of the year that country actually did not reach its limit. For the year, Germany's excess production was about 1,350,000 tons. Although the quota fixed by the entente was exceeded, the penalties do exert a restraining influence on production, because the member-countries are disposed to incur a fine of $4 per ton only if the demand for steel is adequate. With the two exceptions mentioned, Czecho-Slovakia alone of the other countries of Europe did not produce more than in 1927. Those nations that made the greatest strides in proportion to their capacity were: France, Italy, Austria and Russia. The last-named country, however, remained behind its schedule. Outside of Europe and America, there was a drop in the output of India, but Japan and Australia made progress.



COMPARISON OF STEEL TONNAGES BY PRINCIPAL COUNTRIES, SHOWING UNITED STATES PRODUCING SLIGHTLY BELOW HALF WORLD TOTAL

In pig iron it will be noted that the gain was less spectacular than for steel, the increase over 1927 being only 1.1 per cent. The United States produced 43 per cent of the world total, the same proportion as in 1927, and gained 3 per cent over its output of that year.

In Europe, most countries made progress, with the exception of Great Britain, Germany, Sweden and Hungary. India and Australia also registered a loss. Exports of the five leading producing countries, as shown in Table II, were slightly less active in 1928 than in the previous year. The United States made a better showing, having shipped more material to foreign countries than in any year since 1920. Germany also expanded in foreign markets, but shipments were below the 1926 tonnage. Great Britain maintained her position, while France and the Belgo-Luxemburg economic union lost some ground. Imports into Great Britain last year receded considerably, being 23.5 per cent less than in 1927, but still 11.5 per cent more than in 1925.

The general trend of opinion in Europe points toward continuation of satisfactory conditions. Some measure of relief will be given the heavy industries in Great Britain, and greater production and exports should result if parliamentary elections next summer do not interfere.

Once Germany's labor troubles are settled, production in that country is bound to be intensified to catch up the last time. Italy apparently has turned the corner. Spain's capacity of production is increasing, and the other nations of Europe have no special difficulties, except perhaps, Sweden. Russia is bent upon increasing her output, if circumstances permit. Quieter conditions in China should be accompanied by a revival in that quarter. The United States may take breathing space, but looks into a clear sky. But the progress toward a better understanding between European nations is the best omen of more prosperous trade for every country of the world.

Table I

The World's Production of Iron and Steel

Before and Since the War—Gross Tons

Pig Iron

	1928	1927	1926	1925	1924	1923	1922	1921	1920	1913
United States	37,400,000	36,289,000	39,101,000	36,370,000	31,077,000	40,026,000	26,851,000	16,506,000	36,401,000	30,653,000
Canada	1,030,000	760,000	795,000	596,000	619,000	909,000	402,000	616,000	999,000	1,015,000
Great Britain	6,630,000	7,294,000	2,458,000	6,262,000	7,307,000	7,440,000	4,902,000	2,616,000	8,035,000	10,260,000
France	9,890,000	9,150,000	9,281,000	8,358,000	7,570,000	5,346,000	5,147,000	3,308,000	3,380,000	5,126,000
Belgium	3,815,000	3,692,000	3,345,000	2,501,000	2,798,000	2,114,000	1,587,000	858,000	1,099,000	2,445,000
Luxemburg	2,725,000	2,680,000	2,472,000	2,325,000	2,123,000	1,384,000	1,652,000	955,000	682,000	.....
Italy	495,000	487,000	505,000	474,000	299,000	232,000	155,000	60,000	87,000	420,000
Spain	610,000	584,000	479,000	520,000	489,000	394,000	207,000	341,000	247,000	418,000
Sweden	385,000	448,000	493,000	455,000	526,000	297,000	271,000	314,000	477,000	730,000
Germany	11,500,000	12,893,000	9,490,000	10,014,000	7,687,000	4,857,000	9,246,000	7,719,000	6,931,000	19,000,000
Austria	450,000	428,000	328,000	374,000	263,000	337,000	316,000	220,000	98,000	2,344,000
Czechia	1,515,000	1,241,000	1,071,000	1,147,000	967,000	804,000	330,000	568,000	725,000	.....
Poland	660,000	607,000	322,000	310,000	331,000	512,000	472,000	437,000	42,000	.....
Hungary	275,000	294,000	185,000	92,000	114,000	123,000	97,000	70,000	.....	.....
Russia	3,290,000	2,985,000	2,395,000	1,521,000	746,000	379,000	183,000	112,000	113,000	4,563,000
Japan	1,375,000	1,225,000	1,160,000	917,000	820,000	796,000	691,000	646,000	718,000	236,000
China	300,000	300,000	400,000	380,000	200,000	175,000	180,000	126,000	125,000	239,000
India	1,010,000	1,145,000	902,000	888,000	877,000	614,000	340,000	371,000	312,000	204,000
Australia	425,000	550,000	442,000	439,000	416,000	330,000	84,000	352,000	344,000	47,000
Saar territory	1,900,000	1,743,000	1,599,000	1,427,000	1,367,000	1,005,000	1,138,000	1,131,000	956,000	.....
Miscellaneous	450,000	400,000	350,000	300,000	250,000	110,000	100,000	75,000	75,000	100,000
World Total	86,130,000	85,195,000	77,573,000	75,670,000	66,801,000	68,184,000	54,351,000	37,401,000	61,846,000	77,714,000

Steel Ingots and Castings

United States	51,400,000	44,935,000	48,294,000	45,394,000	37,932,000	44,944,000	33,603,000	19,785,000	42,133,000	31,301,000
Canada	1,230,000	907,000	782,000	756,000	661,000	884,000	481,000	669,000	1,110,000	1,043,000
Great Britain	8,495,000	9,099,000	3,596,000	7,385,000	8,201,000	8,482,000	5,881,000	3,703,000	9,067,000	7,664,000
France	9,170,000	8,100,000	8,295,000	7,327,000	6,791,000	5,029,000	4,464,000	3,010,000	3,002,000	4,614,000
Belgium	3,865,000	3,645,000	3,320,000	2,508,000	2,829,000	2,260,000	1,540,000	752,000	1,233,000	2,428,000
Luxemburg	2,530,000	2,431,000	2,208,000	2,053,000	1,857,000	1,182,000	1,372,000	742,000	576,000	.....
Italy	1,950,000	1,569,000	1,752,000	1,757,000	1,337,000	1,124,000	966,000	689,000	762,000	919,000
Spain	690,000	660,000	598,000	616,000	531,000	456,000	230,000	394,000	200,000	238,000
Sweden	525,000	491,000	487,000	467,000	493,000	267,000	306,000	208,000	430,000	582,000
Germany	14,000,000	16,050,000	12,145,000	12,000,000	9,678,000	6,204,000	11,527,000	9,837,000	9,130,000	18,632,000
Austria	630,000	551,000	473,000	462,000	371,000	500,000	484,000	354,000	233,000	2,585,000
Czechia	1,800,000	1,845,000	1,549,000	1,476,000	1,200,000	984,000	640,000	903,000	957,000	.....
Poland	1,350,000	1,226,000	775,000	779,000	667,000	1,114,000	979,000	841,000	70,000	.....
Hungary	470,000	464,000	320,000	227,000	235,000	278,000	253,000	163,000	61,000	.....
Russia	4,150,000	3,662,000	3,087,000	2,087,000	1,122,000	713,000	351,000	311,000	158,000	4,181,000
Japan	1,680,000	1,635,000	1,475,000	1,279,000	1,106,000	973,000	932,000	901,000	861,000	300,000
China	30,000	30,000	50,000	50,000	50,000	50,000	50,000	47,000	51,000	100,000
India	445,000	575,000	520,000	449,000	335,000	215,000	150,000	183,000	156,000	.....
Australia	500,000	448,000	338,000	351,000	306,000	200,000	220,000	209,000	168,000	.....
Saar territory	2,050,000	1,865,000	1,709,000	1,554,000	1,423,000	981,000	1,242,000	905,000	664,000	.....
Miscellaneous	250,000	220,000	125,000	225,000	175,000	175,000	125,000	80,000	80,000	100,000
World Total	107,210,000	100,408,000	91,898,000	89,202,000	77,300,000	77,015,000	65,796,000	44,686,000	71,102,000	74,687,000

German figures in 1913 are for pre-war territory. Austrian figures in 1913 include the major portion of Czechia and Hungary. Japan's figures include Manchuria and Corea.

Table II

Exports and Imports of the Principal Countries

Gross Tons — Scrap Eliminated

	Exports					Imports				
Country	1928	1927	1926	1925	1913	1928	1927	1926	1925	1913
United States	2,270,000	1,963,000	2,082,000	1,820,000	2,648,000	705,000	662,000	996,000	856,000	273,000
Great Britian	4,205,000	4,200,000	2,988,000	3,731,000	4,969,000	2,975,000	4,406,000	3,738,000	2,720,000	2,231,000
Germany (a)	4,750,000	4,254,000	4,822,000	3,210,000	6,200,000	2,115,000	2,215,000	1,038,000	1,181,000	300,000
France(b)	4,985,000	5,688,000	4,274,000	3,985,000	640,000	140,000	142,000	193,000	186,000	185,000
Belgium and Luxemburg (c)	4,250,000	4,630,000	3,793,000	3,159,000	1,550,000	860,000	638,000	560,000	533,000	874,000
Total	20,460,000	20,735,000	17,959,000	15,905,000	16,007,000	6,795,000	8,063,000	6,525,000	5,476,000	3,863,000

(a) Includes reparations deliveries since 1927.
(b) Includes Saar figures since Jan. 10, 1925.
(c) Includes Luxemburg, except for 1913.

Year of Progress for Belgian Industry

(*Concluded from Page* 115)

the large Luxemburg concern, operate the Laminoirs du Ruau and several wire mills and wire nail works.

Conditions in the coal industry were unsatisfactory, although in a better position than in 1927. The output during first quarter exceeded that of the corresponding period of 1927, and the increase continued throughout 1928. The output per man per shift also increased and attained about 560 kilograms per man for each day's work.

The tendency toward an improvement in the collieries is mostly due to the satisfactory occupation of consuming industries. Prices were stable and the output of coke was easily marketed. Coke production averaged about 475,000 metric tons per month in 1928, against 448,880 tons in 1927. As a matter of fact, the coal crisis pertained particularly to domestic coal. A special committee is studying the situation of the coal industry, and the government is prepared to take steps to give relief and has, in fact, placed the question before the League of Nations in view of the international aspect of the crisis.

Attempts have been made to reorganize the coal industry and to amalgamate the various collieries, but there are great difficulties on account of the locations of the coal measures. However, a syndicate has been formed which includes all the coke producers, except those cokeries which are directly operated by iron and steel works. The annual output of the syndicated coke ovens amounts to about 3,500,000 metric tons. This syndicate will probably commence operating Jan. 1, and its object will be to control prices.

German Production Is on Lower Basis

(*Concluded from Page* 112)

a year previously. In November, owing to the lockout in the Ruhr district, only about 30 furnaces were in blast. Domestic consumption of pig iron in the first three quarters is estimated at 9,700,000 metric tons, against 9,600,000 tons a year before, irrespective of stocks.

Supplies of raw materials from foreign sources were considerably smaller than in 1927. In the first nine months, imports of iron ores aggregated only 10,700,700 metric tons, compared with 13,358,400 tons in 1927, the loss mainly corresponding to Swedish ores. The principal countries of origin were Spain, Sweden and France. In July the leading German iron producers signed a 10-year agreement with the British Imperial Productions Co., effective Jan. 1,1929, providing for the annual delivery of about 700,000 metric tons of Wabana ores. The German import surplus of scrap during the first nine months dropped from 268,000 metric tons to 127,300 tons, chiefly on account of smaller arrivals from Holland and Belgium. Notwithstanding the increased subsidies paid by the coal mines for the export of coal, foreign sales of this commodity were considerably less than in 1927, causing an important reduction of coal output. It is expected that the recently-started schemes for the utilization of coal for the distant supply of gas and for the manufacture of nitrogen will help to reduce costs of production, thus alleviating the position of the coal mines.

Belgian and Luxemburg Iron and Steel Exports

(Metric tons)

Principal commodities	(First nine months) 1928	1927	1926*
Pig iron and ferroalloys	72,354	111,253	101,189
Ingots	23,903	17,045	33,163
Semifinished steel	453,118	700,230	534,209
Bars and shapes	1,408,464	1,472,647	1,039,177
Special steel	1,449	1,941	503
Wire rod and wire	205,318	141,686	79,781
Bands and hoops	101,374	82,913	28,839
Plates and sheets, black and galvanized, etc.	463,633	413,242	195,306
Tinplates	2,171	1,137	260
Wire nails, screws, nuts and bolts	104,180	86,843	77,380
Barbed wire and fencing	28,457	29,834	20,341
Rails and track material	195,693	244,620	175,687
Tires, wheels and axles	13,174	12,624	8,303
Constructional steelwork	25,763	26,654	16,824
Cast iron pipe	24,869	32,378	12,628
Other iron castings	22,947	20,880	15,065
Cables and chains	2,210	1,943	988
Forged tubes	30,793	30,126	12,029
Hardware and sundries	41,975	44,469	46,226
TOTAL	3,228,845	3,472,465	2,397,898
Scrap	176,212	140,373	96,451
TOTAL, including scrap	3,405,057	3,612,838	2,494,349

*The first nine months of 1926 were influenced by floods and strikes. Exports increased in the last quarter.

French Metallurgy on Prosperous Plane

(*Concluded from Page* 114)

dustries also have had to submit to heavier taxation, while railroad rates have increased by 10 per cent since March 1. This naturally has reacted on the cost of production. However, the railroad companies now are studying a scheme which would enable them to relieve to some extent the burden borne by the heavy industries. Another difficulty that impedes the progress of the French iron and steel industries is the shortage of labor, particularly in the northern and central districts.

Summarizing the activities of the past year, it will be seen that 1928 has been for the French iron and steel industries a year of comparative prosperity notwithstanding certain difficulties which still have to be solved. This improvement will certainly be registered in the financial results when the fiscal year is over.

Following this period of activity, a reaction might be expected; this was the case in 1926, when the iron and steel trades effected a considerable volume of business, but the conditions both in the domestic market and in the relations between France and neighboring countries were quite different than at present. In competent circles the outlook on the future is hopeful. With regard to international trade, the existence of the various syndicates is looked upon as an asset, and as far as the domestic market is concerned, the existence of the national comptoirs promises a period of stability. In addition, the Loucheur bill was passed during the year, promising government aid for the construction of a large number of houses, and this is bound to have a beneficial effect on the steel trade. It is further noted that in 1930 an exhibition of much importance will celebrate the centenary of the Algerian colony, and in 1931 there also will be an international colonial exhibition in Paris, which will be particularly important, and past experience has shown that in years immediately preceding such events a substantial fillip is given to the iron and steel industry.

Reveal New Vistas for Use of Steel

(*Concluded from Page 9*)

range, with sheet steel ventilating hood; ventilating fan, electric refrigerator, pressed steel enameled sink with electric steel dish washer, incinerator, waste basket, ceilings, walls, dripboards, etc., the latter of enameled steel to imitate tile.

A company in the Pittsburgh district is producing stainless sheet steel and is furnishing many tons each week to a manufacturer of kitchen utensils. These are competing with enamelware.

Steel, enameled to resemble tile, is successfully used in kitchens, bathrooms, halls, stores, auditoriums, etc. In the South, sheet steel which is so finished as to imitate stone and brick is extensively used for dwelling house foundations.

The trend toward utilization of steel for grave vaults is unmistakable. One company utilizes 84-inch wide blue annealed sheets. The main part of the vault is formed with one operation of an hydraulic press. This company expects to increase its steel consumption in 1929 by 25 to 35 per cent.

Agricultural implement makers enjoyed somewhat of a renaissance last year, utilizing more steel than in any one single year since the war. All signs point to a continuation of this trend toward the mechanization of the farm. While Henry Ford has removed his tractor building plant from Michigan to Cork, Ireland, the outlook for tractor production in this country never was brighter as 1929 is contemplated.

Closely allied with expanding agricultural effort is the Mississippi river flood prevention effort. This as well as the Muscle Shoals development, Boulder Dam and other governmental projects, will call for tonnages of steel for revetments and other purposes. All of this together with many private power units, should materialize within the next year. Undoubtedly too, something concrete will be accomplished in connection with President-elect Hoover's $3,000,000,000 construction reserve plan, that will spell "steel."

In 1928 new adaptations of sheet steel have been made largely through the efforts of the Sheet Steel Trade Extension committee. Extensive plans are being laid for a continuation of its program.

Sheet unloaders, ready mixed concrete transportating machines, road building machinery, electrical devices including a recent invention an electric razor, automatic coal handling equipment and other new equipment have either been improved in the year or new types brought forth. In the manufacture of vending or slot machines, steel manufacturers see an increasingly important steel outlet. About 250,000 machines are to be placed in operation in 1929 for dispensing various articles, requiring no further effort than the depositing of the required coin. Makers now are working upon a machine to handle paper money. The dispensing of gasoline on the slot machine idea is a possibility.

Voting machines, made largely of sheet steel and parts made on automatic screw machines, are in greater vogue.

The telephone industry, which now employs 443,000 people in the United States, of which number 328,000 are employed by the Bell system, is responsible for a large increase in steel consumption this past year. It has put up numerous large buildings. It has changed over many thousands of telephones from manual to automatic. The changeover to the French style of instrument with receiver and transmitter combined meant a large tonnage of strip steel.

Steel is in the ascendency. Better merchandizing methods will keep it there. Steel men's organizations in general realize, however, that it is not enough to expand the old uses to which steel is put; they must devise new ones. They are planning coordinated effort similar to that of the sheet association referred to. They are developing a steel complex. Some of the best minds in the industry will be devoted to the production of ideas for the further expanded use of this widely diversified material—STEEL.

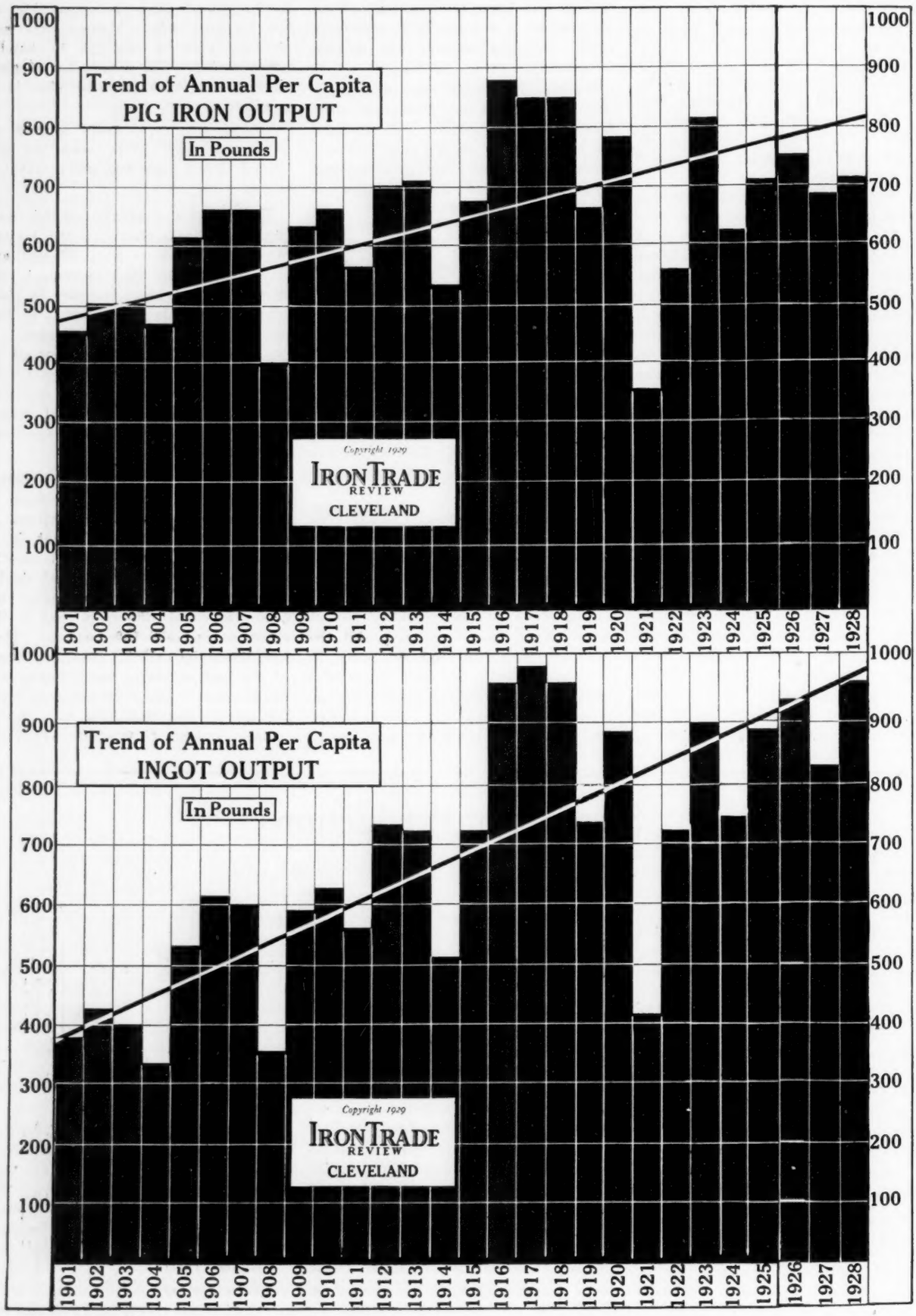
Steel Ingot Production

Compiled by American Iron and Steel Institute

	1919		1920		1921		1922		1923	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	3,650,845	135,216	3,524,026	130,519	2,517,042	96,809	1,891,857	72,764	3,841,095	142,263
February	3,177,311	132,388	3,401,760	141,740	1,998,705	83,279	2,071,772	86,324	3,471,843	144,660
March	3,127,481	120,288	3,916,960	145.073	1,794,777	66,473	2,814,667	104,247	4,066,680	150,618
April	2,631,087	101,196	3,132,458	120,479	1,386,897	53,342	2,902,240	116,090	3,963,736	158,549
May	2,266,109	83,930	3,423,178	131,661	1,446,181	55,622	3,218,794	119,215	4,216,355	156,161
June	2,607,015	104,281	3,538,971	136,114	1,146,350	44,090	3,127,775	120,299	3,767,256	144,894
July	2,946,465	113,326	3,327,785	127,992	917,824	36,713	2,952,806	118,112	3,531,458	141,258
August	3,225,942	124,075	3,562,411	137,016	1,300,199	48,156	2,629,256	97,380	3,695,788	136,881
September	10,062,540	96,755	3,561,365	136,976	1,342,092	51,619	2,818,261	108,395	3,356,776	134,271
October			3,580,873	137,726	1,847,139	71,044	3,410,265	131,164	3,577,091	132,485
November			3,132,891	120,496	1,896,483	72,942	3,430,309	131,935	3,134,321	120,551
December			2,778,714	106,874	1,630,395	62,707	3,300,416	132,017	2,863,266	114,531
Total	33,694,795	*108,343	40,881,392	*131,030	19,224,084	*61,814	34,568,418	*111,511	43,485,665	*139,825

	1924		1925		1926		†1927		†1928	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	3,649,913	135,182	4,193,281	155,307	4,132,210	158,931	3,789,874	145,764	3,991,332	153,513
February	3,826,246	153,050	3,752,352	156,348	3,785,051	157,710	3,812,046	158,835	4,045,304	161,812
March	4,206,699	161,796	4,194,340	161,321	4,468,617	165,504	4,535,272	167,973	4,507,520	166,945
April	3,348,466	128,787	3,583,676	137,834	4,105,799	157,915	4,127,335	158,744	4,302,573	172,103
May	2,640,034	97,779	3,454,971	132,883	3,927,979	151,076	4,047,251	155,663	4,203,190	155,674
June	2,065,676	82,627	3,204,451	123,248	3,734,153	143,621	3,495,609	134,446	3,742,964	143,960
July	1,877,789	72,223	3,084,472	118,634	3,634,993	139,807	3,204,135	128,165	3,811,573	152,463
August	2,552,891	98,188	3,420,998	131,577	3,986,966	153,345	3,498,549	129,576	4,178,481	154,759
September	2,827,625	108,755	3,489,565	134,214	6,913,383	150,515	3,268,881	125,726	4,147,583	165,903
October	3,125,418	115,756	3,888,814	144,030	4,074,544	156,713	3,316,292	127,550	4,647,891	172,144
November	3,121,149	124,846	3,902,900	156,116	3,705,744	142,529	3,127,015	120,270	4,259,380	163,822
December	3,569,251	137,279	3,970,918	152,728	3,466,766	133,337	3,175,484	122,134	.....	.....
Total	36,811,157	*117,984	44,140,738	*141,932	46,936,205	*150,920	43,397,743	*139,543	.....	.....

*Average. ‡Estimated. †Beginning with 1927, the Institute excludes crucible and electric ingots which will total approximately 124,000 tons for the year


Trend of Annual Per Capita
PIG IRON OUTPUT
In Pounds
Copyright 1929
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CLEVELAND
Trend of Annual Per Capita
INGOT OUTPUT
In Pounds
Copyright 1929
IRON TRADE REVIEW
CLEVELAND
1000
900
800
700
600
500
400
300
200
100
1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928

Per Capita Steel Output at Record

Ingots and Castings Increase to 959 Pounds For Year

Pig Iron Output for Each Person 711 Pounds in 1928

UNDER the stimulation of an extraordinary demand, the production of steel ingots and castings in 1928 reached a new high record for all time. Pig iron production also increased but it fell substantially short of a new record. The higher rate of steel mill operations is reflected in a sharp gain in the per capita production of steel ingots and castings which rose to 959 pounds during the year. This compared with 848 pounds per capita of steel ingots and castings produced in this country in 1927 and a previous peace-time peak of 924 pounds in 1926. These records were exceeded only in the war-time years of 1918, 1917 and 1916. In 1916 per capita production of steel ingots and castings was 950 pounds. It was 987 pounds in 1917, 961 pounds in 1918.

Because of the enormous war demand which existed in those earlier years, however, no true comparison can be made with peace-time years. The real significance of the 1928 record is that it is one measure of the steady and remarkable progress in living standards in this country. Steel is the universal metal providing raw material for many of the products which go to make up the vast sum total of modern comforts and conveniences.

Pig iron production in 1928 represented a per capita output of 711 pounds. This compared with 691 pounds in 1927 and with 752 pounds in 1926.

The figures reveal that the per capita production of ingots and castings was 248 pounds greater than that for pig iron. One year ago the spread between pig iron and ingots was 157 pounds and in 1926 it was 172 pounds. In 1921 there was a spread of only 65 pounds and in 1913 the difference was only 11 pounds in favor of steel ingots and castings.

The increase in the spread between these two products merely carries forward a trend which has been noted over recent years. It indicates the widespread adoption of the open-hearth process of making ingots. This process makes possible a more generous employment of scrap metal. Pig iron which was extremely weak during most of 1928 showed a tendency to gather strength toward the close of the year.

The estimated output of coke and charcoal pig iron in 1928 is 38,063,000 tons. This compares with 36,565,645 tons produced in 1927. In 1926 production was 39,472,000 tons.

The aggregate production of steel ingots in 1928 is estimated at 50,190,000 tons. The output of steel castings is placed at 1,210,000 tons, making a total of 51,400,000 for steel ingots and castings compared with 44,935,185 tons in 1927.

The graph on the opposite page shows the per capita production of pig iron and steel ingots compared with the line showing computed normal over a long period. It is interesting to note that in 1928 the per capita output of steel ingots and castings was at the line computed as normal for the year. Pig iron production per capita, however, continued well below its normal although it showed an increase over 1927.

The population of the United States as of July, 1928, as estimated by the United States Bureau of Census was 120,013,000. This was an indicated increase of 1,385,000 over 1927 and compares with an estimated increase of 1,492,000 in 1927 over 1926. The method of estimating the population used by the bureau of census is one where birth, deaths and immigration and emigration figures are computed.

All Steel Production Per Capita 1878-1928

Year	Population in thousands	Steel ingots and castings output in gross tons thousands	Output per capita pounds
1928	120,013	51,400	959
1927	118,628	44,935	848
1926	117,136	48,294	924
1925	115,378	45,394	881
1924	113,727	37,932	746
1923	111,693	44,943	911
1922	109,893	35,603	726
1921	108,445	19,783	409
1920	106,422	42,132	887
1919	105,003	34,671	739
1918	103,587	44,462	961
1917	102,172	45,060	987
1916	100,757	42,773	950
1915	99,342	32,151	724
1914	97,927	23,513	509
1913	96,512	31,300	725
1912	95,097	31,251	736
1911	93,682	23,676	565
1910	92,174	26,094	634
1909	90,556	23,955	592
1908	88,939	14,023	353
1907	87,320	23,362	599
1906	85,702	23,398	611
1905	84,085	20,023	533
1904	82,467	13,859	335
1903	80,848	14,534	402
1902	79,231	14,947	422
1901	77,612	13,473	375
1900	75,995	10,188	300
1899	74,318	10,639	320
1898	72,947	8,932	274
1897	71,592	7,156	223
1896	70,254	5,281	168
1895	68,934	6,114	198
1894	67,632	4,412	146
1893	66,349	4,019	135
1892	65,086	4,927	169
1891	63,844	3,904	121
1890	62,948	4,277	152
1889	61,298	3,385	123
1888	59,974	2,899	108
1887	58,680	3,339	127
1886	57,404	2,562	99
1885	56,148	1,711	68
1884	54,911	1,550	63
1883	53,693	1,673	69
1882	52,495	1,736	74
1881	51,316	1,588	69
1880	50,156	1,247	55
1879	48,886	935	42
1878	47,598	732	34

Pig Iron Production Per Capita 1878-1928

Year	Population in thousands	Pig iron output in gross tons thousands	Output per cap pounds
1928	120,013	38,063	711
1927	118,628	36,511	691
1926	117,135	39,372	752
1925	115,378	36,700	713
1924	113,727	31,406	618
1923	111,693	40,361	806
1922	109,893	27,219	554
1921	108,445	16,688	344
1920	106,422	36,926	777
1919	105,003	31,015	661
1918	103,587	39,054	843
1917	102,172	38,621	846
1916	100,757	39,434	876
1915	99,342	29,916	677
1914	97,927	23,332	533
1913	96,512	30,966	717
1912	95,097	29,726	700
1911	93,682	23,649	564
1910	92,267	27,303	663
1909	90,556	25,795	638
1908	88,939	15,936	400
1907	87,320	25,781	661
1906	85,792	25,307	661
1905	84,085	22,992	612
1904	82,467	16,497	462
1903	80,848	18,009	500
1902	79,231	17,821	504
1901	77,612	15,878	458
1900	75,995	13,789	406
1899	74,318	13,620	409
1898	72,947	11,773	361
1897	71,592	9,652	302
1896	70,254	8,623	274
1895	68,934	9,446	306
1894	67,632	6,657	220
1893	66,349	7,124	239
1892	65,086	9,157	315
1891	63,844	8,279	289
1890	62,948	9,202	327
1889	61,298	7,603	277
1888	59,974	6,489	242
1887	58,680	6,417	244
1886	57,404	5,683	221
1885	56,148	4,044	161
1884	54,911	4,097	166
1883	53,693	4,595	191
1882	52,495	4,623	197
1881	51,316	4,144	188
1880	50,156	3,835	171
1879	48,886	2,741	125
1878	47,598	2,301	108

Pig Iron Production

IN GROSS TONS

Annual Statistics of Coke and Anthracite Pig Iron Compiled by American Iron and Steel Institute, Monthly Statistics, 1908 to date, by IRON TRADE REVIEW

1856....	457,738	1869....	1,361,153	1882....	4,000,193	1895....	9,220,967
1857....	417,711	1870....	1,339,284	1883....	4,085,041	1896....	8,311,833
1858....	374,804	1871....	1,363,043	1884....	3,670,567	1897....	9,397,469
1859....	496,952	1872....	2,101,760	1885....	3,687,522	1898....	11,477,184
1860....	572,713	1873....	2,045,231	1886....	5,273,010	1899....	13,335,937
1861....	478,809	1874....	1,886,479	1887....	5,900,914	1900....	13,404,760
1862....	536,609	1875....	1,656,777	1888....	5,955,105	1901....	15,494,913
1863....	656,785	1876....	1,593,382	1889....	7,028,374	1902....	17,431,138
1864....	798,342	1877....	1,782,805	1890....	8,574,558	1903....	17,503,568
1865....	597,536	1878....	2,039,252	1891....	7,702,906	1904....	16,157,504
1866....	918,717	1879....	2,151,431	1892....	8,619,379	1905....	22,639,452
1867....	997,576	1880....	3,355,228	1893....	6,737,713	1906....	24,874,184
1868....	1,100,893	1881....	3,573,863	1894....	6,434,966	1907....	25,343,964

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1908	
January	398	139	1,081,813	34,897
February	401	150	1,086,809	37,476
March	398	154	1,229,856	39,672
April	398	146	1,155,122	38,504
May	396	145	1,168,002	37,677
June	395	154	1,106,300	36,876
July	397	166	1,228,604	39,632
August	399	181	1,366,019	44,065
September	399	189	1,416,252	47,208
October	400	200	1,573,824	50,764
November	402	212	1,582,314	52,744
December	403	221	1,723,664	55,602
Total			15,718,579	*42,947

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1909	
January	406	234	1,787,473	57,683
February	407	233	1,682,470	60,088
March	406	229	1,822,024	58,793
April	406	224	1,731,406	57,687
May	407	236	1,866,757	60,218
June	408	240	1,929,929	64,334
July	409	258	2,088,620	67,375
August	412	278	2,232,642	72,021
September	413	297	2,378,655	79,201
October	413	309	2,589,681	83,538
November	414	311	2,532,740	84,425
December	416	314	2,682,702	86,539
Total			25,325,099	*69,383

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1910	
January	416	311	2,599,995	83,871
February	417	311	2,429,525	86,768
March	417	310	2,588,736	83,508
April	418	291	2,477,700	82,590
May	419	279	2,374,802	76,607
June	420	271	2,288,279	76,276
July	420	254	2,158,124	69,617
August	422	244	2,103,791	67,864
September	420	234	2,048,461	68,282
October	421	230	2,086,205	67,297
November	421	218	1,910,385	63,679
December	421	193	1,779,899	57,416
Total			26,845,902	*73,550

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1911	
January	421	210	1,766,658	56,985
February	421	226	1,781,285	63,617
March	421	236	2,165,764	69,863
April	421	220	2,044,904	68,163
May	421	206	1,871,388	60,367
June	421	202	1,773,282	59,109
July	423	196	1,776,108	57,294
August	423	206	1,921,832	61,995
September	423	216	1,973,918	65,797
October	421	214	2,092,061	67,486
November	421	214	1,999,100	66,637
December	422	215	2,032,301	65,558
Total			23,198,601	*63,558

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1912	
January	421	227	2,052,806	66,220
February	422	235	2,098,796	72,372
March	420	237	2,411,529	77,791
April	421	239	2,377,621	79,254
May	423	243	2,503,341	80,753
June	424	242	2,433,737	81,125
July	422	245	2,402,567	77,502
August	423	255	2,500,163	80,650
September	419	262	2,444,454	81,482
October	422	280	2,683,645	86,569
November	423	289	2,639,562	87,985
December	423	291	2,777,292	89,590
Total			29,325,513	*80,124

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1913	
January	423	297	2,787,800	89,929
February	423	306	2,578,670	92,095
March	423	278	2,762,823	89,123
April	421	297	2,754,353	91,812
May	421	285	2,816,825	90,865
June	422	283	2,616,883	87,229
July	422	264	2,558,275	82,525
August	424	260	2,537,018	81,839
September	425	258	2,494,098	83,137
October	425	244	2,539,924	81,933
November	424	225	2,229,960	74,322
December	424	191	1,976,138	63,746
Total			30,652,767	*83,980

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1914	
January	423	199	1,879,336	60,624
February	423	219	1,888,607	67,450
March	423	232	2,341,551	75,534
April	422	212	2,261,501	75,383
May	422	198	2,097,019	67,646
June	422	193	1,904,566	63,486
July	422	187	1,955,324	63,075
August	422	187	1,996,483	64,403
September	422	180	1,882,718	62,757
October	422	162	1,767,227	57,007
November	421	150	1,501,269	50,042
December	421	154	1,495,325	48,236
Total			22,970,926	*62,934

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1915	
January	421	165	1,591,024	51,323
February	421	179	1,666,592	59,521
March	421	190	2,046,280	66,009
April	421	197	2,114,518	70,484
May	421	207	2,255,157	72,747
June	421	221	2,369,932	78,998
July	421	234	2,563,311	82,687
August	421	246	2,774,825	89,510
September	420	266	2,834,342	94,478
October	420	276	3,120,340	100,656
November	421	285	3,035,235	101,174
December	421	295	3,201,605	103,278
Total			29,573,161	*81,022

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1916	
January	421	304	3,171,878	102,319
February	421	312	3,078,548	106,157
March	422	315	3,327,630	107,343
April	422	320	3,225,496	107,517
May	423	321	3,364,584	108,535
June	423	325	3,213,818	107,127
July	419	316	3,221,127	103,907
August	419	317	3,197,838	103,156
September	419	326	3,208,041	106,935
October	419	328	3,508,180	113,167
November	420	322	3,317,805	110,593
December	422	309	3,184,178	102,715
Total			39,019,123	*106,609

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1917	
January	422	310	3,159,839	101,930
February	422	317	2,649,935	94,641
March	423	331	3,255,813	105,026
April	425	333	3,328,061	110,936
May	425	340	3,413,677	110,119
June	427	347	3,260,234	108,675
July	429	351	3,337,442	107,659
August	431	357	3,238,970	104,483
September	431	342	3,140,742	104,691
October	433	354	3,296,286	106,332
November	434	344	3,198,597	106,620
December	435	321	2,885,380	93,077
Total			38,164,976	*104,561

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1918	
January	435	294	2,403,227	77,523
February	435	319	2,318,242	82,723
March	438	338	3,209,996	103,548
April	437	351	3,273,355	109,112
May	437	360	3,451,884	111,351
June	437	353	3,316,148	110,538
July	437	364	3,408,584	109,954
August	438	371	3,378,479	108,983
September	438	364	3,413,223	113,774
October	437	364	3,482,392	112,335
November	437	360	3,347,844	111,595
December	435	351	3,434,114	110,778
Total			38,437,488	*105,308

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1919	
January	435	330	3,306,279	106,654
February	435	311	2,943,347	105,120
March	435	279	3,088,023	99,614
April	435	216	2,474,374	82,479
May	433	197	2,107,729	67,991
June	433	199	2,114,028	70,467
July	434	240	2,424,212	78,200
August	432	266	2,742,081	88,453
September	433	163	2,480,790	82,692
October	432	216	1,864,424	60,142
November	432	252	2,407,369	80,244
December	432	262	2,626,074	84,711
Total			30,578,730	*83,777

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1920	
January	432	285	3,012,373	97,172
February	432	305	2,984,257	102,904
March	433	315	3,375,768	108,895
April	433	278	2,752,670	91,754
May	433	297	2,991,825	96,510
June	433	302	3,046,623	101,553
July	434	291	3,043,918	98,190
August	434	306	3,145,536	101,468
September	434	317	3,124,308	104,143
October	435	290	3,288,341	106,075
November	435	255	2,935,081	97,836
December	435	202	2,700,268	87,105
Total			36,400,968	*99,456

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1921	
January	436	184	2,414,753	77,895
February	436	155	1,929,394	68,906
March	436	103	1,594,866	51,447
April	436	96	1,190,751	39,691
May	436	90	1,215,272	39,202
June	436	74	1,064,007	35,466
July	435	69	864,642	27,892
August	436	69	954,901	30,802
September	435	84	985,795	32,859
October	435	95	1,234,450	39,821
November	429	120	1,414,958	47,165
December	429	123	1,642,775	52,992
Total			16,506,564	*45,223

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1922	
January	430	127	1,645,804	53,090
February	429	139	1,630,180	58,220
March	429	155	2,035,908	65,674
April	429	161	2,070,161	69,005
May	427	175	2,309,348	74,495
June	427	191	2,362,455	78,748
July	427	170	2,403,030	77,517
August	427	143	1,810,665	58,408
September	427	189	2,024,008	67,466
October	428	218	2,629,655	84,827
November	428	241	2,846,110	94,870
December	428	253	3,083,520	99,468
Total			26,850,844	*73,563

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1923	
January	428	261	3,228,226	104,136
February	424	278	2,993,918	106,925
March	424	295	3,523,595	113,664
April	423	311	3,546,308	118,210
May	423	322	3,868,486	124,790
June	424	322	3,667,868	122,262
July	418	299	3,684,677	118,860
August	418	270	3,448,886	111,254
September	418	254	3,117,526	103,917
October	418	245	3,142,642	101,375
November	418	229	2,891,191	96,373
December	418	231	2,912,527	93,952
Total			40,025,850	*109,659

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1924	
January	414	248	3,015,480	97,273
February	414	263	3,073,619	105,987
March	410	269	3,465,389	111,787
April	410	234	3,226,107	107,537
May	411	187	2,619,986	84,515
June	411	158	2,022,836	67,427
July	411	145	1,783,457	57,531
August	411	150	1,882,986	60,741
September	411	174	2,053,617	68,454
October	411	182	2,461,727	79,410
November	411	204	2,514,979	83,832
December	411	229	2,956,389	95,367
Total			31,076,572	*84,908

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1925	
January	411	251	3,372,207	108,781
February	411	256	3,214,067	114,788
March	410	246	3,571,422	115,207
April	409	221	3,211,235	107,041
May	405	196	2,933,907	94,642
June	399	191	2,679,045	89,301
July	396	188	2,665,262	85,976
August	391	192	2,707,171	87,328
September	387	200	2,725,885	90,862
October	386	209	3,017,889	97,351
November	385	220	3,023,257	100,775
December	385	234	3,249,057	104,808
Total			36,370,404	*99,645

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1926	
January	385	225	3,319,789	107,089
February	382	223	2,923,850	104,423
March	377	235	3,458,171	111,554
April	376	237	3,438,805	114,627
May	376	229	3,477,820	112,187
June	372	220	3,232,478	107,749
July	372	217	3,224,663	104,021
August	372	215	3,200,723	103,249
September	372	216	3,163,269	105,442
October	374	218	3,334,206	107,555
November	375	216	3,237,992	107,933
December	369	203	3,089,175	99,651
Total			39,100,941	*107,126

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1927	
January	369	210	3,101,346	100,043
February	369	217	2,940,604	105,021
March	365	223	3,482,107	112,326
April	364	221	3,424,377	114,146
May	363	211	3,391,067	109,388
June	362	198	3,089,726	102,991
July	362	190	2,954,625	95,311
August	362	189	2,950,674	95,183
September	362	181	2,782,500	92,750
October	361	174	2,812,015	90,712
November	359	171	2,661,863	88,728
December	354	169	2,698,208	87,039
Total			36,289,112	*99,422

	—Stacks— No.	In	——Output—— Total	Av. Daily
			1928	
January	353	184	2,855,515	92,113
February	353	186	2,898,668	99,954
March	350	197	3,199,175	103,199
April	349	195	3,181,975	106,066
May	345	199	3,292,790	106,219
June	343	189	3,082,340	102,745
July	342	185	3,072,711	99,120
August	340	183	3,136,995	101,193
September	340	194	3,063,593	102,120
October	338	196	3,373,539	108,824
November	337	194	3,303,680	110,123

December figures, Page 71.

*Average

Statistics of Consumption

FREIGHT CAR ORDERS

Compiled by IRON TRADE REVIEW

Month	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
January	13,000	2,500	21,700	15,000	200	3,180	4,500	1,700	11,000	15,000	8,150	1,695	8,830	14,710	4,160
February	9,000	4,000	12,900	7,750	4,575	60	7,000	200	14,500	9,300	41,350	5,510	12,895	5,960	10,220
March	7,500	1,100	8,750	21,500	2,190	150	5,500	1,400	12,000	42,500	13,150	4,730	8,895	4,955	2,958
April	10,000	1,500	7,000	4,250	31,150	575	20,500	350	31,500	9,800	10,250	5,060	4,615	3,675	6,043
May	6,000	18,000	4,500	15,000	70,165	360	8,000	250	18,250	2,200	511	6,985	4,448	5,425	2,531
June	15,000	17,000	5,100	8,200	400	1,010	5,500	1,500	13,100	1,785	438	1,835	4,285	7,440	2,422
July	7,000	9,500	2,600	8,650	30,000	2,510	7,000	900	13,700	1,450	886	800	1,265	2,295	582
August	1,100	3,000	15,025	13,000	10,000	2,125	7,000	150	1,610	2,780	5,980	2,875	152	1,181	677
September	100	9,000	14,500	1,100	4,000	3,975	3,500	550	10,350	897	27,630	7,905	3,335	682	1,378
October	50	22,500	26,000	42,800	40,900	4,750	6,500	6,500	12,700	1,125	5,885	11,145	2,840	886	2,853
November	500	11,500	37,000	10,000	200	350	2,500	7,000	18,500	5,050	12,720	11,685	3,925	1,189	6,140
December	2,000	10,400	19,600	1,000	8,000	1,000	2,500	550	23,255	11,600	18,475	16,885	8,990	14,897	.....
Total	71,250	110,000	174,675	148,250	201,780	20,045	80,000	22,050	180,465	103,487	144,425	77,110	64,475	63,295	.....

AUTOMOBILE PRODUCTION

Passenger Cars and Trucks, in United States

Compiled by Department of Commerce

Month	1921	1922	1923	1924	1925	1926	1927	1928
January	.....	89,374	244,302	318,526	240,592	309,544	238,927	231,693
February	.....	117,871	277,601	370,319	283,577	364,180	304,763	323,809
March	.....	171,487	358,779	382,718	374,425	434,470	394,443	413,386
April	.....	219,394	377,936	375,858	433,783	441,307	404,759	410,191
May	.....	255,622	393,826	314,105	419,267	421,184	404,115	426,101
June	.....	278,876	378,558	251,775	398,490	387,900	321,967	396,967
July	176,870	245,755	330,039	270,312	397,753	359,275	268,485	390,445
August	181,270	270,838	346,843	284,649	260,590	426,606	308,826	461,298
September	158,760	203,927	327,892	296,333	325,847	395,687	260,387	415,283
October	148,009	232,824	365,451	294,643	442,114	334,421	219,719	398,818
November	116,644	232,923	313,597	234,615	372,498	256,301	134,416	256,936
December	79,455	225,285	305,431	207,065	316,768	167,924	133,579	.....
Total	861,008	2,544,176	4,020,255	3,600,918	4,265,704	4,298,799	3,394,386	.....

FABRICATED STRUCTURAL STEEL SALES

Computed, in net tons, by Department of Commerce

Month	1922	1923	1924	1925	1926	1927	1928
January	.....	227,760	224,940	187,380	208,800	195,000	210,000
February	.....	243,360	228,200	194,320	208,800	243,750	266,250
March	.....	290,160	221,680	225,550	234,000	232,500	258,750
April	258,400	243,360	208,640	256,780	252,000	262,500	236,250
May	240,160	180,960	192,340	229,020	266,400	232,500	311,250
June	221,920	165,360	208,640	284,540	262,800	228,750	303,750
July	206,720	162,240	221,680	274,130	248,400	345,000	292,500
August	206,720	184,080	192,340	267,190	284,400	273,750	287,141
September	194,560	165,360	211,900	270,660	216,000	262,250	256,811
October	176,320	159,120	211,900	298,420	230,400	288,750	184,643
November	152,000	171,600	270,580	239,430	223,200	236,250	243,750
December	185,440	249,600	247,760	253,310	255,600	262,500	.....
Total	1,842,240	2,442,960	2,640,600	2,980,730	2,890,800	3,063,500	.....

COMMERCIAL STEEL CASTINGS BOOKINGS

Compiled by Department of Commerce

In net tons

Month	1920	1921	1922	1923	1924	1925	1926	1927	1928
January	81,011	39,430	45,618	126,188	69,615	103,881	111,958	107,779	91,072
February	85,610	37,094	48,550	112,080	91,258	81,703	101,120	94,683	90,677
March	127,988	32,489	62,290	171,659	126,599	83,527	113,363	90,041	83,285
April	100,846	25,862	89,644	117,803	93,146	87,172	91,142	81,044	83,737
May	99,619	23,966	93,302	117,416	79,705	78,098	84,166	72,744	86,414
June	87,849	23,829	105,927	109,359	67,753	66,103	73,465	90,898	71,745
July	81,935	21,720	83,795	73,249	54,301	71,993	79,470	74,246	66,714
August	81,108	25,256	82,307	75,876	50,102	70,881	71,011	63,528	80,862
September	82,845	29,544	116,195	71,260	75,769	61,949	69,495	52,351	82,329
October	61,794	39,737	98,028	64,339	82,886	80,206	77,549	51,748	77,783
November	55,079	50,313	82,114	63,599	91,158	86,688	73,234	62,683	84,304
December	47,781	41,172	89,598	60,761	115,341	105,547	89,805	76,953	.....
Total	993,465	390,412	997,368	1,163,589	997,633	977,748	1,035,778	918,698	.....

Discounts and Extras

Steel Pipe

Pittsburgh and Lorain basing discounts, jobber's carloads.

Evanston, Ill., and Indiana Harbor, Ind., take differential 2 points less discount.

Chicago takes differential 2½ points less than Pittsburgh-Lorain basis.

Butt Weld

	Black	Galvanized
⅛-inch	45	19½
¼ and ⅜-inch	51	25½
½-inch	56	42½
¾-inch	60	48½
1 to 3-inch	62	50½

Lap Weld

2-inch	55	43½
2½ to 6-inch	59	47½
7 to 8-inch	56	43½
9 and 10-inch	54	41½
11 and 12-inch	53	40½

REAMED AND DRIFTED

Butt Weld

1 to 3-inch	60	48½

Lap Weld

2-inch	53	41½
2½ to 6-inch	57	45½

EXTRA STRONG—PLAIN ENDS

Butt Weld

⅛-inch	41	24½
¼ and ⅜-inch	47	30½
½-inch	53	42½
¾-inch	58	47½
1 to 1½-inch	60	49½
2 to 3-inch	61	50½

Lap Weld

2-inch	53	42½
2½ to 4-inch	57	46½
4½ to 6-inch	56	45½
7 to 8-inch	52	39½
9 and 10-inch	45	32½
11 and 12-inch	44	31½

DOUBLE EXTRA STRONG

Butt Weld

½-inch	42	32½
¾ to 1½-inch	45	35½
2 to 2½-inch	47	37½

Lap Weld

2-inch	41	32½
2½ to 4-inch	43	34½
4½ to 6-inch	42	33½
7 to 8-inch	38	25½

(Note—Large jobbers obtain additional preferential discounts of 1 and 5 on black and 1½ and 5 on galvanized. Extra 5 per cent granted in the 4th quarter 1927 and 1st quarter 1928 discontinued April 2, 1928.)

Wrought Iron Pipe

Pittsburgh basing discounts, jobbers' carloads. Individual quotations made on delivered basis.

THREADS AND COUPLING

Butt Weld

¼ and ⅜-inch	+11	+39
½-inch	22	2
¾-inch	28	11
1 to 1½-inch	30	13

Lap Weld

1¼ and 1½-inch	Upon application	
2-inch	23	7
2½ to 3-inch	26	11
3 to 6-inch	28	13
7 to 12-inch	26	11

PLUGGED AND REAMED

Two points less than above

EXTRA STRONG, PLAIN ENDS

¼ and ⅜-inch	+19	+54
½-inch	21	7
¾-inch	28	12
1 to 1½-inch	30	14

Lap Weld

2-inch	23	9
2½ to 4-inch	29	15
4½ to 6-inch	28	14
7 to 8-inch	21	7
9 to 12-inch	16	2

DOUBLE EXTRA STRONG

Butt Weld

½-inch	+47½	+59½
¾-inch	+28	+40
1-inch	+34	+46
1¼-inch	+28	+40
1½-inch	+27	+39

Lap Weld

2 and 2½-inch	+13	+25
3 and 4-inch	+ 8	+17
4½ to 6-inch	+ 9	+18
8-inch	+12	.....

(Note—Large jobbers obtain additional preferential discounts of 1, 5 and 2½ on black and galvanized.)

Boiler Tubes

Pittsburgh carload discounts

STEEL (Lap Weld)

2 and 2¼-inch	40 off
2½ and 2¾-inch	48 off
3-inch	54 off
3¼ to 3¾-inch	56 off
4-inch	59 off
4½ to 6-inch	48 off

Subject to two 5 per cent discounts on full carload shipments. On less than 10,000 pounds, base discount reduced 6 points and one 5 per cent allowed. On 10,000 pounds to carload, base discount reduced 4 points and two 5 per cents allowed.

CHARCOAL IRON

1½-inch	1 off
1¾-inch	8 off
2 and 2¼-inch	13 off
2½ and 2¾-inch	16 off
3-inch	17 off
3¼ to 3½-inch	18 off
4-inch	20 off
4½-inch	21 off

Subject to 10 per cent discount on full carload lots. On less than 10,000 pounds, base discount reduced 2 points and no preferential allowed. On 10,000 pounds to carload, 5 per cent preferential allowed.

SEAMLESS COLD DRAWN

1-inch	63 off
1¼ and 1½-inch	55 off
1¾-inch	39 off
2 and 2¼-inch	34 off
2½ and 2¾-inch	42 off
3-inch	48 off
3¼ and 3½-inch	50 off
4-inch	53 off
4½, 5 and 6-inch	42 off

SEAMLESS HOT ROLLED

1¾-inch	39 off
2 and 2½-inch	40 off
2½ and 2¾-inch	48 off
3-inch	54 off
3¼ and 3½-inch	56 off
4-inch	59 off
4½, 5 and 6-inch	48 off

Subject to 5 per cent supplementary discount for carload lots. On less than 10,000 pounds, base discount reduced 6 points. On 10,000 pounds to carload, base discount reduced 4 points and one 5 per cent allowed.

SEAMLESS STEEL MERCHANT BOILER TUBES

Extras:

Add 5 per cent for lengths over 24 feet and not over 26 feet.

Smaller tubes than 1-inch and lighter than standard gage to be sold at mechanical tubing list and discount.

Intermediate sizes and gages not listed above take price of next larger outside diameter and heavier gage.

SEAMLESS STEEL MECHANICAL TUBING

Base Discounts on New List July 1, 1925

Carbon 0.10 to 0.30 per cent.....50 to 55 off
Carbon 0.30 to 0.40 per cent.....45 to 50 off

SEAMLESS STEEL LOCOMOTIVE AND SUPERHEATER TUBES

Net prices per foot f.o.b. Pittsburgh

Outside diameter	Gage	Price
21-inch	12-gage	14¼c
2-inch	11-gage	15c
2-inch	10-gage	16c
2¼-inch	12-gage	16c
2¼-inch	11-gage	17c
2¼-inch	10-gage	18c
3-inch	7-gage	33c
5¾-inch	9-gage	50c
5½-inch	9-gage	52c

Plus usual extras for forming and for long lengths over 18 feet and for commercially exact lengths.

Plate Extras

BASE

Rectangular plates, tank steel or conforming to manufacturers' Standard Specifications for structural steel, date Nov. 24, 1922, or equivalent, ¼-inch thick and over on thinnest edge (except for ¼-inch or 72 inches wide when ordered to weight in pounds per square foot—see width and gage extras), 100 inches wide and under, down to but not including 6 inches wide, 5 feet 0 inches long up to published limit in length but not over 80 feet 0 inch, are base. Extras per pound for width or diameter.

All Plates Rectangular or Otherwise

¼-inch thick and heavier, but not less than 11 pounds per square foot, if ordered to weight.

Over 100 to and including 110 inches	.05c
Over 110 to and including 115 inches	.10c
Over 115 to and including 120 inches	.15c
Over 120 to and including 125 inches	.25c
Over 125 to and including 128 inches	.50c
Plates less than ¼-inch or lighter than 11 pounds per square foot.	
Over 72 to and including 84 inches	.10c
Over 84 to and including 96 inches	.20c
Over 96 to and including 100 inches	.30c

Over 100 inches add .35c to width extras for plates ¼-inch thick and heavier.

GAGE

Plates Not Exceeding 72 Inches Wide

Plates less than ¼-inch gage, to and including 3/16-inch; or lighter than 10.2 pounds per square foot, to and including 7.65 pounds square foot	.20c

Plates Over 72 Inches Wide

Plates less than ¼-inch gage, to and including 3/16-inch; or lighter than 11 pounds per square foot, to but not including 7.65 pounds square foot	.20c
Plates ordered 7.65 pounds square foot	.30c

QUALITIES

Pressing steel	.10c
Flange steel (boiler grade)	.15c
Ordinary firebox steel	.20c
Stillbottom steel	.30c
Locomotive firebox steel	.50c
Marine steel	1.50c
Hull materials subject to U. S. Navy Dept. specifications for medium or soft steel	.10c
High tensile hull steel subject to U. S. navy department or equivalent specifications	1.00c
Boiler steel subject to U. S. navy department specifications, classes A-B	1.50c

Hull plates to hull specifications, required to stand cold flanging, take extra for flange steel.

Floor Plates

Checkered plates 1.75c

Checkered plates are not furnished to sketch and are rolled from "Stock Steel" only. No physical tests will be made on checkered plates.

INSPECTION

Mill inspection .....No extra

Charges for other inspection, such as Lloyd's or American bureau of shipping, will be made by inspection bureau direct to buyer.

CUTTING

LENGTH OR DIAMETER

All Plates, Rectangular or Otherwise

Five feet and over up to published limit of length, but not over 80 feet	No extra
Under 5 feet to 3 feet inclusive	.10c
Under 3 feet to 2 feet inclusive	.25c
Under 2 feet to 1 foot inclusive	.50c
Under 1 foot	1.55c
Over 80 feet to 100 feet inclusive	.10c

Over 100 feet add .25c plus .05c for every additional 2 feet or fraction thereof.

Regular Sketches

With not more than four straight cuts. (Including straight taper plates)

Additional extra ..... .10c

Irregular Sketches

With not more than four straight cuts. (Sketches cannot be sheared with re-entrant angles)

Additional extra ..... .20c